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# MICROSCOPIC EXAMINATION OF NICKELIFEROUS PYRRHOTITES

## Results of a Study to Settle a Much Discussed Question in Ore Deposition

BY WILLIAM CAMPBELL AND C. W. KNIGHT*

In going over the literature of pyrrhotites in general with a view to attacking the problem of their constitution from the microscopic standpoint, we were led to the study of nickeliferous pyrrhotites first of all. Considering what we may take as typical examples, the Sudbury deposits, those of Norway (Flaat and Erteli mines), of Sohland in Germany, the Gap mine, Penn., and the St. Stephen deposit, N. B., we were impressed by the fact that although the geology and petrography had in most cases been clearly worked out, the relation of the opaque constituents had been neglected. In addition the problem of their origin is still a matter of controversy.

In the first place it was necessary to find in what form the nickel occurred, and whether the occurrence varied in different deposits; then by working out the relations of the opaque constituents to each other and incidentally to the gangue, it seemed likely that much light might be thrown on the subject. In many deposits of nickeliferous pyrrhotite the nickel occurs as pentlandite (FeNi)S, and chalcopyrite is usually present. With such material it seemed to us that the relations could be worked out by metallographic means almost as easily as we examine a piece of steel or babbitt metal.

Specimens of the deposits mentioned above were obtained through the kindness of C. W. Dickson, Ph.D., School of Mining, Kingston, Ont., and of Professor Kemp and Dr. Berkey, of Columbia University, to whom our thanks are due. The method of grinding, polishing and examining opaque material such as orebodies has already been described[1] and an example of the method has been given in this Journal.[2] It will be, therefore, necessary only to give the results obtained from examining, by reflected light, highly polished surfaces with or without the aid of etching. In the present work the various constituents can be recognized by the following:

DISTINGUISHING CHARACTERS OF THE CHIEF OPAQUE CONSTITUENTS. POLISHED SURFACES

*Chalcopyrite*—Yellow color. Polishes easily. Hardness = 4.

*Magnetite*—Steel-gray color. Polishes well. Etches along cleavage planes, often yielding "gridiron" structure. $H = 5.5 - 6.5$.

*Pentlandite*—Light bronze color. Polishes better than pyrrhotite, not so brittle. Sometimes shows distinct cleavage. Distinguished from pyrrhotite by etching. $H = 4$.

FIG. 1. PENTLANDITE AND PYRRHOTITE, X50
Copper Cliff, No. 2 Mine, Sudbury

FIG. 2. CHALCOPYRITE IN SILICATE, X88
Creighton Mine

*Pyrite*—Pale brass color. Polishes with difficulty. Usually shows scratches. $H = 6 - 6.5$. Polishes in relief.

*Pyrrhotite*—Light bronze color, similar to pentlandite. More brittle than pentlandite and shows more pitted surface. $H = 4$. By immersing a specimen in hot HCl(1:1), pyrrhotite is attacked, pentlandite is not. This proves an easy method of distinction.

To sum up, chalcopyrite, magnetite and pyrite are easily distinguished by color and habit from pentlandite and pyrrhotite. Pyrrhotite is distinguished from pentlandite by etching.

THE SUDBURY DEPOSITS

The origin of these deposits has been the subject of great discussion, one side attempting to prove that they were derived from eruptive magmas by differentiation, the other that they are not of igneous origin, but have been deposited

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[1] W. Campbell, *School of Mines Quarterly*, July, 1906, XXVII, 414.

[2] W. Campbell and C. W. Knight, ENGINEERING AND MINING JOURNAL, June 9, 1906, LXXXI, 1089.

from solution. In a paper entitled "the ore-deposits of Sudbury, Ontario,"[3] Chas. W. Dickson has clearly discussed the subject and brings forward a weight of evidence to prove the ores of secondary aqueous origin. He shows that the nickel occurs as pentlandite, and works out the relationship between the sulphides and the gangue. Finally he points out that owing to "the massive nature of the sulphides, very little can be accurately determined as to the paragenesis of the minerals," but says that it is likely that the chalcopyrite is later that the pyrrhotite. Taking up the work where Dr. Dickson left off, and applying metallographic methods we have been able to work out the paragenesis of the pyrrhotite, pentlandite and chalcopyryte.

Specimens from the Copper Cliff, Gertrude, Creighton and Mount Nickel mines, and from the North Nickel belt were examined, and the relations worked out as follows.

THE COPPER CLIFF MINE

The specimen consisted of coarse-grained pyrrhotite, associated with pentlandite, chalcopyrite, magnetite and a little gangue which we shall hereafter call silicate. On etching, the pentlandite is seen to occur as a more or less irregular network around the grains of pyrrhotite, and also as definitely oriented inclusions within the grain itself, just as we find cementite occurring in high carbon steel after heating to say 1200 deg. C. The relation is clearly shown in Fig. 1, where the unetched pentlandite lies as a network between four grains of deeply-etched pyrrhotite. The specimen contains a little chalcopyrite, which occurs along with the pentlandite, and in a few places cuts it as veins. The structure of the whole shows that the pentlandite was deposited between the grains of the pyrrhotite, while later on chalcopyrite was also deposited there. In this way we find the chalcopyrite intimately associated with the pentlandite.

The magnitite occurs as more or less rounded grains imbedded in a matrix of pyrrhotite, and is clearly earlier, while any silicate present shows rounding off and smoothing of angles, and is intimately associated with chalcopyrite, often forming a nucleus for the latter. To sum up, the specimen shows the order of the minerals to be: (1) Magnetite and silicate; (2) pyrrhotite; (3) pentlandite; (4) chalcopyrite. The relation of the sulphides is shown by Fig. 1, and the occurrence of the nickel mineral as minute lenses included in the pyrrhotite explains why complete magnetic and other separations have been impossible.

THE GERTRUDE MINE

The specimen to the eye contained pyrrhotite, pentlandite and chalcopyrite. Silicate also is present. Under the microscope veins of pentlandite and chalcopyrite are found cutting the pyrrhotite. The silicate, in places surrounded by pyrrhotite, is clearly strained, and shows rounded-off angles and corroded sides. A crystal of magnetite is seen within the silicate, and has its angles more or less sharp. The order is therefore magnetite, silicate, pyrrhotite, pentlandite and chalcopyrite.

THE CREIGHTON MINE

Veins of chalcopyrite and pentlandite occur in pyrrhotite. The specimens showed much silicate. The pentlandite and chalcopyrite are seen as fine lenses within the pyrrhotite grains, and also as more or less irregular veins and masses. The chalcopyrite veins often cut those of pentlandite and therefore are a little later. Thus we have the same order for the sulphides as before.

Dickson in his paper[4] has given very clearly the relation of the sulphides to the silicates, and his illustrations show the replacement. Our results confirm his deductions, but of course our illustrations are by reflected light. The manner in which chalcopyrite will traverse a silicate crystal is seen in Fig. 2. The chalcopyrite shows up light, and the silicate dark. Other parts of the field show pyrrhotite and pentlandite penetrating and replacing the silicate, which, when isolated, is frequently strained. Reaction zones are often seen. The magnetite as before occurs as rounded grains, which etch with a characteristic structure, due to differential etching along certain planes. Here again we have the same order of origin as in the Copper Cliff mine.

NORTH NICKEL RANGE

The specimens contained, in addition to the other minerals, quite a lot of pyrite. Even after prolonged polishing, the pyrite shows its characteristic rough appearance, and is easily recognized. The boundaries of the pyrite show some rounding off, though occasionally a section of a perfect cube can be seen. Often, however, the grain has been broken up. The ground mass is a mixture of silicate, chalcopyrite and pyrrhotite.

The magnetite occurs as more or less rounded crystals, and is earlier than the pyrite, which is found in places to inclose it. The silicate is often strained, and contains intrusions of chalcopyrite, as in Fig. 2. The relation of the chalcopyrite, pentlandite and pyrrhotite is exactly the same as before. We therefore have the order as follows: magnetite, pyrite, pyrrhotite, pentlandite and chalcopyrite. From the structures met with it would seem that the pyrite was older than the silicate—in other words, an original constituent of the rock, before the advent of the three sulphides. It is certainly very much older than they.

CONCLUSIONS AS TO THE SUDBURY ORES

From the above we see that in the

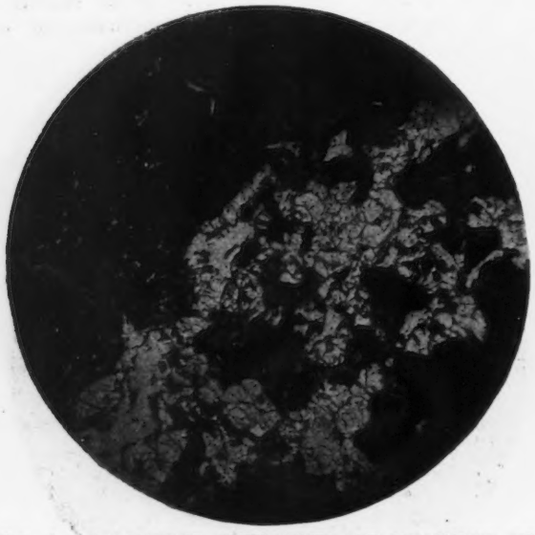

FIG. 3. CHALCOPYRITE, PENTLANDITE AND PYRRHOTITE, X50
Sohland.

FIG. 4. PENTLANDITE AND PYRRHOTITE, X50
Flaat Mine. Norway.

[3]Trans. A. I. M. E., 1904, p. 3.

[4]*Trans.*, A. I. M. E., 1904, pp. 32, 34, 35 and 38.

specimens of Sudbury ores examined a definite order of deposition is shown: (1) pyrrhotite, (2) pentlandite, (3) chalcopyrite. The magnetite belongs to the original rock, and probably so does the pyrite; at all events it was present when the rock was strained and broken before the deposition of the pyrrhotite. The replacement of the silicate by the sulphides is also seen, and helps to confirm Dr. Dickson's work.

The relations of the later sulphides—galena, blende, etc.—were shown in a specimen from Mount Nickel mine, and though not bearing on the subject of the present paper are worthy of mention. The specimen consisted of pyrrhotite through which ran a small vein, ¼ in. thick. The grains of pyrrhotite were strained and were oriented in many cases with tiny cubes of what seemed to be pyrite. Veins of pentlandite and chalcopyrite occurred as before. The impurity of the pyrrhotite had evidently been thrown out in the solid and would be enough to account for any variation in analyses.

The vein itself consists of galena, blende, quartz and chalcopyrite, and shows a symmetrical arrangement. The two outer walls are very thin and consist of quartz containing a little blende and chalcopyrite. The center is broader and consists of quartz containing numerous crystals of blende and a few of chalcopyrite. The quartz is the ground mass. Between the outer shell and the inner quartz core the vein is filled with galena. The structure seems to show that the central core is a second vein in the galena.

THE NICKEL DEPOSITS OF SOHLAND, SAXONY

The geology of these orebodies has been described by Beck. They occur in the so called Lausitzer granite, and are closely associated with diabase dikes.[5] The ore consists of pyrrhotite, chalcopyrite and pyrite, which were introduced *after* the complete cooling and differentiation of the rock magma. Dickson was unable to determine in what condition the nickel existed in the ore. The specimen examined showed a banded structure of the chalcopyrite and pyrrhotite. On etching we were able to distinguish the pentlandite as small grains intimately associated with chalcopyrite. Fig. 3 shows the mixed chalcopyrite and pentlandite set in the midst of dark pyrrhotite. In addition, very thin veins of pentlandite are found around the smaller grains of pyrrhotite. Minute flakes of pentlandite also occur within the grain itself, similar to those in the Sudbury ores. The pyrrhotite is clearly older than the pentlandite and chalcopyrite, but the relative ages of the latter are not clear. The structures as a whole, however, seem to indicate that the chalcopyrite is later.

NORWEGIAN NICKEL DEPOSITS

The nickel deposits of Norway are usually given as examples of orebodies of igneous origin. They are intimately associated with gabbro or norite, and have been described in detail by Vogt. Specimens were obtained from the Flaat and Erteli mines, and examined in the usual way.

FLAAT (FLAAD) MINE

The specimens were composed of chalcopyrite, pentlandite and pyrrhotite associated with more or less silicate. In one specimen the pentlandite was seen around the pyrrhotite grains as veins which widened out into masses. Fig. 4 shows a vein of lighter chalcopyrite and pentlandite set between the grains of the darker pyrrhotite. On the right of the figure is a grain of magnetite. In another specimen the chalcopyrite and pentlandite occur not only as veins and masses, but also as plates or lenses definitely oriented within the pyrrhotite grains. The order is clearly the same as that at Sudbury. It is interesting to note that the silicate includes along its cleavage line much chalcopyrite and pyrrhotite. Some of the silicate crystals are badly shattered and replaced by the sulphides and when they occur isolated in the pyrrhotite are always more or less eroded and rounded off. In short the relations of the ore constituents are so nearly akin to those of Sudbury that a similar mode of origin seems the only conclusion.

THE ERTELI MINE, NO. 2

Two specimens were examined. In one the grain of the pyrrhotite is large and has evidently been strained, being full of cracks which often contain fine inclusions of pentlandite. The pentlandite also occurs as veins and small masses around the pyrrhotite. The chalcopyrite occurs like the pentlandite and also as masses of some size. Fig. 5 shows a mass of lighter chalcopyrite and pentlandite, set in the darker pyrrhotite, which is badly fractured. On the left of the figure is a grain of magnetite in an eroded patch of silicate. Some of the silicate is broken up and altered from granular to fibrous. Another specimen showed the pyrrhotite similarly strained. The pentlandite occurred as thin veins and as fine lenses in the pyrrhotite, but no large masses were seen. The chalcopyrite occurred as large masses and thick veins associated with small amounts of pentlandite. As before, the silicate is often broken up and fibrous and includes the sulphides. Magnetite occurred as rounded grains as before. In other words the relations are the same as those of Sudbury.

THE NICKEL DEPOSITS OF ST. STEPHEN, N. B.

The geology of these deposits has been described by Brummel[6] and by Bailey.[7] They occur in a country of diabases and

FIG. 5. CHALCOPYRITE, PENTLANDITE AND PYRRHOTITE, X50
Erteli Mine, Norway

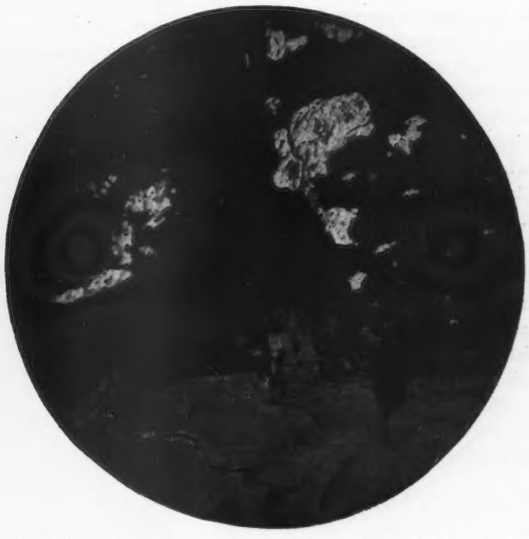

FIG. 6. PENTLANDITE, PYRRHOTITE AND SILICATE, X50
St. Stephen, N. B.

[5] C. W. Dickson, *Journal* Canadian Mining Institute, Vol. IX.

[6] *Geol. Survey of Canada*, V, 1890-91.

[7] *Geol. Survey of Canada*, X, 1897.

diorites which have been severely metamorphosed. Dickson[8] after a careful microscopic study of the ore concludes that the sulphides are of secondary nature, deposited from circulating solutions by a metasomatic replacement of the rock minerals—that the pyrrhotite is older than the chalcopyrite.

The specimen examined shows extremely fine-grained pyrrhotite. Under the microscope the pyrrhotite is seen to be either broken up or very fine grained. It includes very many magnetite crystals, and some small silicate crystals, which are bent and often fibrous. These include and are replaced by pyrrhotite. Chalcopyrite and pentlandite occur as small grains only, the former favoring broken silicate crystals. The structure of the ore is shown in Fig. 6, where the lighter grains of pentlandite occur in a ground mass of dark etching pyrrhotite. At the bottom of the figure is seen a shattered silicate crystal. It seems certain then that the chalcopyrite and pentlandite are later than the pyrrhotite, which has replaced the country rock. The magnetite is undoubtedly a primary constituent, as at Sudbury and elsewhere. The relation of the chalcopyrite to the pentlandite could not be made out owing to their mode of occurrence.

THE GAP MINE, LANCASTER COUNTY, PENN.

The ore occurs at the junction of a mass of amphibolite with the surrounding mica schist. Kemp[9], from the resemblance to the Sudbury deposits, concluded that the ore was formed by differentiation from a basic igneous magma, etc., according to Soret's principle, following the views of Vogt.

A specimen of the ore showed medium-sized grains of pyrrhotite, around which pentlandite occurred as veins and as masses. In places the latter showed a decided cleavage. Chalcopyrite occurs along with the pentlandite and, being molded against it, is presumably later. The sulphides occur as veins cutting the silicate. Thus in the Gap mine we find the relations similar to those of Sudbury.

SUMMARY

From the above examination of nickel ores from widely separated localities, we find certain points of similarity:

(1) The magnetite is primary, being older than the silicates, which are usually more or less shattered, and contain veins and masses of the sulphides where they are not actually replaced by the latter. (2) The sulphides occur in a definite order (*a*) pyrrhotite (*b*) pentlandite (*c*) chalcopyrite. (3) The pentlandite and chalcopyrite are closely associated, and have a habit in common.

Considering the above points *alone*, we are led to believe the mode of origin of all to be the same; that the basic rocks have been more or less shattered or broken; that solutions have replaced the rock matter wholly or in part by pyrrhotite; that later on the pyrrhotite, etc., was also broken, and the deposition of pentlandite and chalcopyrite followed, the pentlandite coming down before the chalcopyrite. We emphasize the word *alone*, because others who are familiar with the localities themselves may see a widely different interpretation to our work, which we offer as a contribution toward the unraveling of the much discussed question, the origin of nickeliferous pyrrhotites.

[8] *Journal* Canadian Institute, Vol. IX, 1906.
[9] "Ore Deposits," 1901, p. 434.

## The Durability of Wood-Stave Pipe*

The great extent to which iron-bound, wooden-stave pipe has been utilized in hydraulic mining, water supplying, and power generating, adds interest to any data on the durability of such water conveyor. In 1895 a pipe line 61,000 ft. between terminals, was built to supply water for Astoria, Ore. Its profile has a vertical range of 400 ft. and includes a number of sharp depressions; in such places steel pipe was employed, elsewhere wood-stave pipe, of 18 in. diameter, was used. Fir wood was the material, and the greatest care was exercised in laying the line.

After ten years of service, the deterioration of the wooden sections of the pipe was unexpectedly serious, and an outlay of more than one-third the original cost was demanded in repairs. Observations on the decay of this pipe may be summarized thus:

(1) Staves, which are constantly subject to water pressure from within and are buried in the ground, may be very short-lived.

(2) The magnitude of the water pressure, beyond a moderate head, has little or no influence in preserving the timber.

(3) The pipe laid above ground has not deteriorated to any considerable extent, nor has the pipe laid in the tunnels leading from the distributing reservoir.

(4) Where buried, its durability has depended upon the soil conditions and the depth of backfill.

(5) When the depth of backfill has exceeded 2 ft. above the pipe, and the material has been free from vegetable matter, and has been of a fine and impervious character, much less deterioration has taken place.

(6) Wherever the staves have been in contact with loamy earth or earth containing vegetable matter, or wherever they have been covered with porous material, or to a depth of less than 2 ft., rapid decay has resulted.

(7) Decayed staves have been found all around the pipe.

(8) Sound staves have been frequently found contiguous to badly decayed staves.

(9) The character of the grain, whether slash or grain edge, has not influenced the durability.

(10) The bruising of the staves during the process of erection seems to have been one of the chief agencies in hastening decay.

(11) Decay has been confined to the outside of the pipe.

(12) The pipe has not usually shown leakage as long as sound wood has remained in excess of ¼ in. thick.

(13) The malleable cast-band fastenings have been found to be in good condition.

(14) The bands, of 7/16 in. size, have been considerably corroded save where secured by the nut, but all have been used again by placing the nut in its original position.

The rapid decay cannot fairly be attributed to the fir wood, because the author has seen a redwood pipe that has shown no greater durability.

*Abstracted from a paper by Arthur L. Adams before the American Society of Civil Engineers, Oct. 17, 1906.

## Mineral Production of Peru in 1905

In the message of the President of the Republic of Peru to the Congress of 1906 the production of various minerals in 1905 was reported as follows:

| | Quantities. | Values. |
|---|---|---|
| Gold in bars, in metallurgical products, and in ores | 733 kg. | £ 97,072 |
| Silver, ditto | 176,000 " | 648,000 |
| Copper | 11,000 tons. | 622,268 |
| Lead | 1,270 " | 5,420 |
| Petroleum, crude | 49,700 " | 124,250 |
| Coal | 72,665 " | 98,300 |
| Salt | 21,083 " | 21,038 |
| Borates | 1,594 " | 14,346 |
| Nickel | 1,778 kg. | 145 |
| Quicksilver | 1,554 " | 340 |
| Bismuth | 12 tons. | 5,000 |

Capital is flowing into the country for the exploitation of mines. Valuable deposits of gold, silver, copper, lead, coal petroleum, and rare metals such as nickel, bismuth, vanadium, and molybdenum are being discovered. The Cuerpo de Ingenieros de Minas is making strenuous efforts with the view of discovering the natural resources of the country.

It is stated that the premier copper-producing mine of Australia for 1906 will be Mount Lyell, with an output aggregating about 8500 tons of metal. Wallaroo & Moonta (South Australia) will be second, with a little over 6000 tons; Great Cobar (N.S.W.) and Mount Morgan (Queensland) will each produce 4000 tons. The O.K. output will scarcely reach 2000 tons this year. These five mines will probably account for nearly 60 per cent. of the Australian copper production for 1906. For 1907, however, many other mines are expected to be important factors.

The United Engineering Society building in New York City is now receiving its interior finish, and contracts for the furnishings and equipment are being carried out. The building will be open for inspection in December, but owing to some unexpected delays it will not be ready for use at that time, as had been hoped.

# THE REHABILITATION OF HYDRAULIC MINING

## Steps Now in Progress to Restore California's Gold-Washing Industry to Its Former Importance, Without Interfering with Agriculture

BY J. P. HUTCHINS*

(*Concluded from page 874.*)

### SEDIMENT TRANSPORT

I made some observations on the sediment-bearing streams of the Klondike in the summers of 1903-04, while mining operations were at their hight, and the amount of material in suspension was greatest. The water tested was dipped from Bonanza creek, about 6 in. from its bottom, where there was a total depth of about 12 in. The creek flowed about 3 sec. ft. and its water, which had been used in probably over 50 sluicing operations, had not deposited any of its content, and was seemingly as muddy as any water could be. I evaporated it to dryness in the sun and found that there had been about 1.75 oz. per gal. in suspension. This expressed in another way means about 0.66 cu.yd. per miners' inch moved in suspension per 24 hr. Another experiment was made when the creek flowed about 7 sec. ft. A tank 30x30x10 ft. was used as a sump for a pump raising about 4000 gal. per minute. The water was diverted from Bonanza creek at the same point where the water mentioned in the preceding experiment was taken, and was carried by a flume to the sump. There were two sand boxes in the flume, with their bottoms 3 ft. below that of the flume and a small gate with a constant stream of water running out prevented any sand rolling along the flume to the sump. Measurements showed that the amount of silt deposited in the sump, where the water had little current, was about 0.40 cu.yd. per miners' inch. Much of this sediment was composed of "muck" (a semi-decomposed, peat-like material) which is frequently encountered as an overburden on the creek alluvion. Thus, under conditions most favorable for transporting silt, the amount of material found was very much less than that said to be carried in California rivers. Judging also by appearances, I should unhesitatingly say that the water of Bonanza creek contained considerably more silt than has any water in California rivers. It is possible that water immediately below the mine dumps will show as large a percentage as this, but much of the silt is deposited long before reaching the valleys.

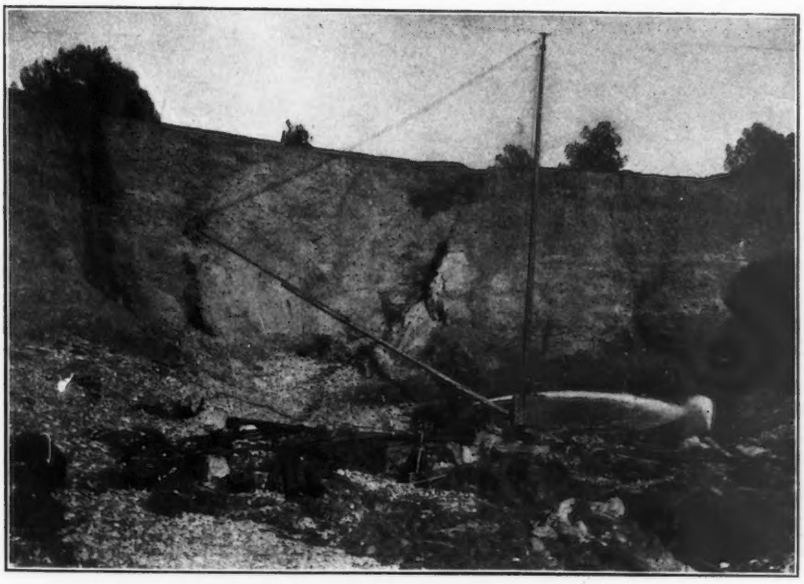

FIG. 8. TYPICAL MINE ON SAN JOAQUIN WATER-SHED

Before the vast undertakings can be judiciously begun, information on the following points must be available:

1. Accurate and detailed surveys of the whole field, including the sources of water supply, their volume and geologic action.
2. The amounts of material from the mines and other sources in the river beds capable of transportation to lower levels.
3. What the gold content of the tailing is, the possibilities for saving it, whether it is sufficient to pay for the installation and maintenance of tailing sluices from the barriers to the marshes, and whether it may be enough to pay for the barriers themselves.
4. Methods for conveying tailing to low land.
5. Information as to the sites, character, cost and storage capacity of tailing barriers for material now in the river and for what will be dumped by the future operation of hydraulic mines.
6. What share, if any, the hydraulic miners shall contribute to barrier maintenance if the savable content of tailing is not sufficient to meet the expenditure.
7. What land is required for tailing reservoirs, how it may be obtained, and what legislative action is necessary.
8. Estimates of the cost of installation and maintenance of apparatus for conveying tailing.
9. What land is susceptible of reclamation with tailing and a method for making the increased value of the land pay for the cost of reclamation.
10. How the increment in land value will result in affecting taxation.
11. Information as to the improvement of rivers and their navigability.
12. The amount of gravel workable by the hydraulic method.
13. Who shall undertake the work of installation and maintenance.
14. How funds shall be provided, and by whom.

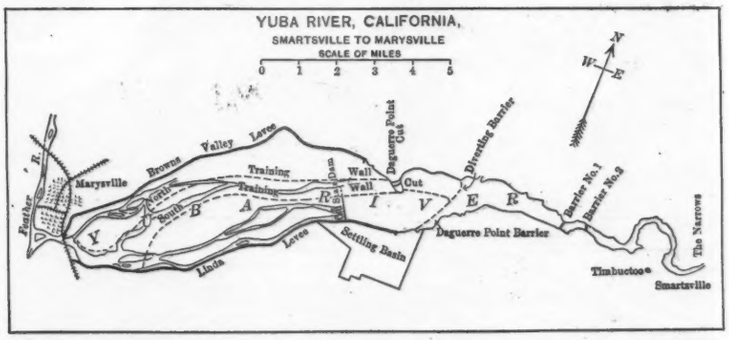


FIG. 11. MAP OF YUBA, SHOWING TRAINING WALLS BUILT OF TAILING BY DREDGEMEN

### SURVEYS

After the hydraulic mines were closed by injunction, examinations were made for the Federal Government in 1880 and 1888

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FIG. 9. TAILING BARRIER ON YUBA RIVER

by engineer officers of the United States army. The State engineer of California also reported, so considerable data are at hand, though much remains to be done. It is with the object of making a preliminary examination and survey of lands appertaining to the Sacramento and San Joaquin rivers, that a bill to appropriate $200,000 has been introduced recently in Congress. This is the first necessary step toward the great scheme suggested by C. E. Grunsky, consulting engineer of the Reclamation Service. This report was made at the suggestion of the California State Miners' Association with the idea of permitting the resumption of hydraulic mining, after some plan shall have been devised for depositing mining tailing on the marsh land of the valley.

If this bill becomes a law, the investigation will probably show that the whole scheme is not only perfectly practicable, but eminently suitable for a solution of the many difficulties. The points numbered 2, 4, 5, 7, 8, 9, 10, 11, 13 and 14 will be partly, and in some cases, thoroughly investigated. Those numbered 3, 6 and 12, and those not completely examined in the preliminary survey, will be looked into later, although some of the features must be covered in the preliminary survey.

Although the engineering features are of great magnitude there are none unusually hard to handle, and the whole solution is one of complex ramification rather than of much difficulty. Specialists will be needed in the various branches of the work and there will be the opportunity for the investigation and solution of a number of unique and interesting applications of familiar engineering practice.

COST OF RESTRAINING DEBRIS

No figures are available for the cost per cubic yard for restraining tailing at the barrier on the Yuba river. The first two steps of the barrier are complete and together make a dam 14 ft. high and about

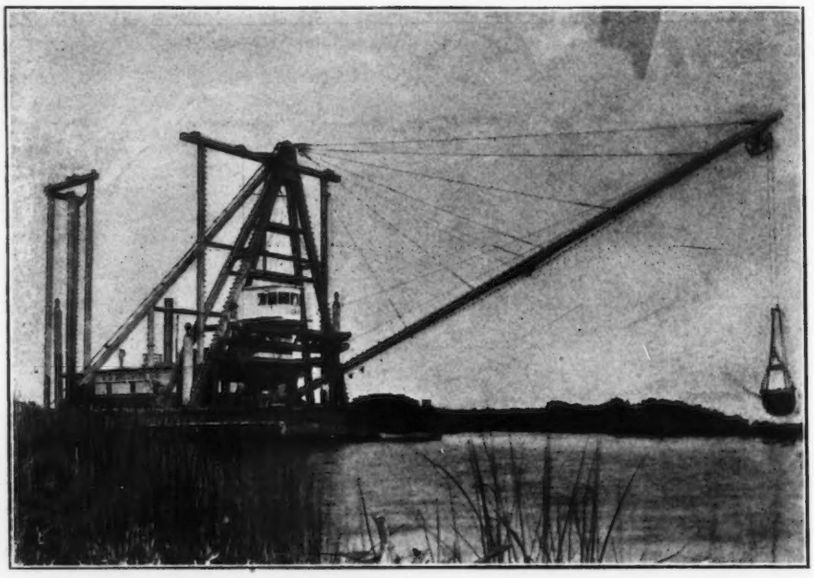


FIG. 10. CLAM-SHELL DREDGE MAKING LEVEL

FIG. 12. NORTH BLOOMFIELD MINE

1250 ft. long. It has cost $129,792, or $103.83 per lin. ft. The volume of material restrained by this dam has not been accurately measured, but the cost of restraining tailing when the barrier is higher will be probably less than 1 mill per cu.yd. The first step, 6 ft. high, is estimated to have impounded 250,000 cu. yd. The next step, of 8 ft., is estimated to have impounded over 1,000,000 cu.yd. It is estimated that the capacity of the tailing reservoir at its present hight is over 3,000,000 cu.yd. When it is filled to its greatest capacity, additional steps will, of course, give much larger capacities.

Figures are availale for the cost of restraining tailing by brush and log-crib barriers. They are located near the mine dumps on sites not favorable for tailing reservoirs. The gradient of the streams, is about 100 ft. to the mile, thus the barriers did not back the tailing far upstream

nor make reservoirs of large capacity. Being close to the mine dump also, a large percentage of bowlders helped to fill the reservoirs rapidly. The cost was about 2.5 and 3 mills per cu.yd., for brush and crib dams respectively.

Where a favorable site can be found at a considerable distance from a mine dump, making it necessary only to impound the fine débris, the cost of restraining tailing will probably be considerably less than one mill per cu.yd. Such an addition to the operating cost of hydraulic mining is not a serious one; it is probable that the present harmonious activity of farmer and miner will result finally in the resumption of hydraulic mining on a large scale.

Fig. 8 is a picture of a mine typical of the San Joaquin watershed. The gravel has a vertical section of about 125 ft. The auriferous slate bedrock, typical of the Mother Lode district, is well shown. The two streams are discharging about 40 sec. ft.; the derrick has a 6-ft. Pelton wheel, and hoists and swings by water power. The mast and boom are each 100 ft. long, and boulders weighing about 8 tons are handled. There are over 75,000,000 cu.yd. in this deposit, and 100 sec. ft. will be ditched to it.

Fig. 9 shows the Yuba barrier as it appeared in June with the river in its higher stages. This structure is eminently successful, and has solved a difficult feature of the tailing problem, namely, that of holding the material now in river as a result of operations in the past. It is 14 ft. high and it impounds about 3,000,000 cu.yd. The first step of 6 ft. held about 250,000 cu.yd. and the second step of 8 ft. holds the rest. The capacity of the dam is incommensurate with its cost and will be until it has been raised somewhat higher. The installation of this barrier has already made the river below to scour its bed considerably.

Fig. 10 depicts one of the larger clamshell dredges used in leveeing and reclaiming the marsh lands. The levee it is building is shown in the background. The 6-cu.yd. bucket hangs on a boom 150 ft. long; with its load it is said to weigh about 25 tons. It possesses a number of advantages due to its weight and power; one of these is its ability to excavate in a stiff clay such as a small dredge cannot handle. This dredge was built by the Golden State and Miners Iron Works of San Francisco. The condition shown in the left foreground is typical of hundreds of square miles of marsh land.

Fig. 11 is a map showing training walls now being built by coarse tailing deposited from gold dredges operating in the Yuba river. The location of the barrier pictured in Fig. 9 is at the point marked "Barrier No. 1." Fig. 12 is a view of part of the famous North Bloomfield mine. The hight of gravel bank is about 300 ft. Material was hydraulicked at a cost of less than 3c. per cu.yd. Fig. 13 illustrates an important feature of the plan for diverting débris from Yuba river to the low-lying area on its banks.

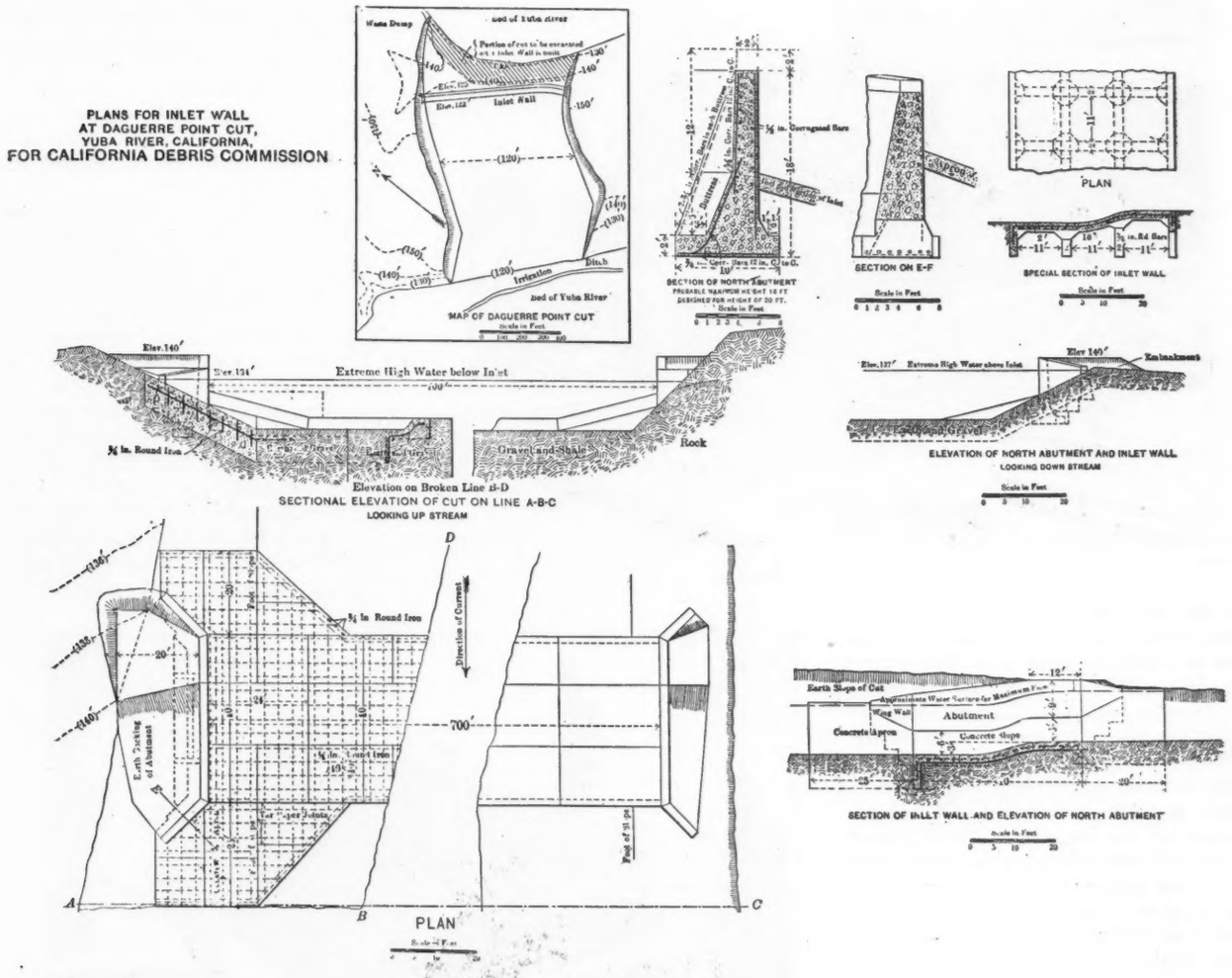



FIG. 13

## Zinc in Algeria

According to a recent British consular report, the districts of Souk-Ahras and Tébessa abound in zinkiferous deposits still unworked. So far only one of these mines—Beccaria—has been seriously exploited. A large mass of mineral between layers of dolomite and marl was found, and since 1899 calamine of good quality has been extracted. The calamine deposits at Djebel-Bourouman, Bou-Jaber, and Khanguet-Tenoukla are now being prospected.

# MAGNETITE MINES AT LYON MOUNTAIN, N. Y.

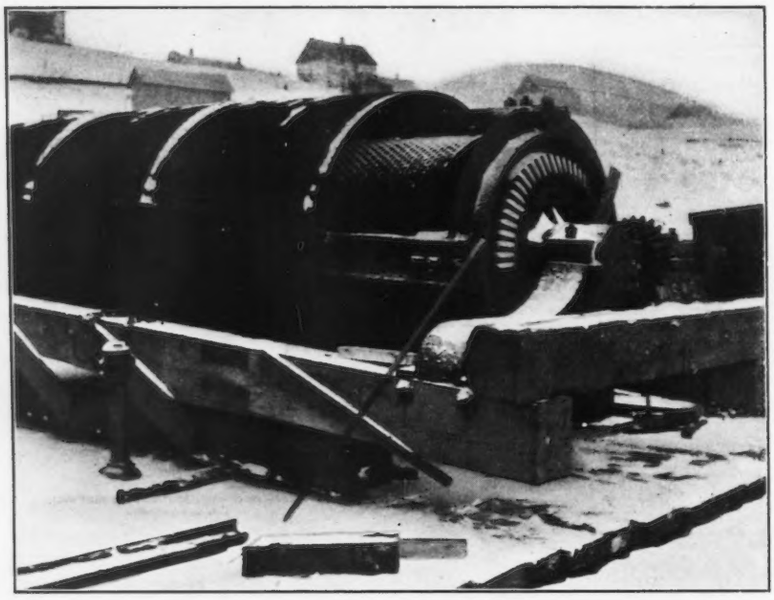
## Description of a New Mill and Magnetic Separator

BY D. H. NEWLAND* AND N. V. HANSELL†

*(Concluded from page 865.)*

MILLING

The crude ore at Lyon mountain has an iron content varying from 25 to 40 per cent., although occasionally richer bodies of ore with 50 to 55 per ecnt. of iron ore struck. The average content or iron can be given as 23 per cent. No sorting of the ore mined is done, but everything is brought to the separating plants of which two are at present in operation, the old mill and the new one. The former was built for wet concentration some 20 years ago, but was later rebuilt and arranged for dry magnetic methods. Other changes in the mill have frequently been made and new machinery has been added as experience suggested. The result is that the arrangement of the mill, as it now stands, is very complicated, especially in regard to the transmission of power, no less than 13,000 ft. of belting being used. Consequently the repair cost and the power consumption of the mill are high. Its crushing capacity is 1000 to 1200 tons of crude ore in 24 hours. The power necessary to run the mill amounts to about 375 h. p. The crew is made up of 32 men per shift.



CYLINDRICAL SCREEN

The new mill has been laid out according to the principles that now govern the work of the old one. Since the ore, as already mentioned, averages only 32 per cent. of iron in the form of disseminated magnetite with a fine granular texture, it has to be crushed down to ¼ in. to obtain the best results in separation. Consequently the crushing part of the mill is very important and the most expensive in operation. The new mill is centrally located on an 18-degree sloping hillside above the new railroad station on an average distance from the hoisting slopes of about 1500 ft. The slopes are connected with the mill by a narrow gage railroad, on which the company runs four 27-ton steam locomotives. The ore cars are side or bottom dumping cars, "side dumpers" and "jimmies," with about six tons load capacity. These cars are braked down around the trestle 40 ft. high that forms a loop over the top of the crude ore bin.

The mill is built of Georgia pine on solid concrete foundations carried up from bed rock. The buildings are double boarded and covered by iron shingles. Almost all machinery is furnished by the Allis-Chalmers Company of Chicago, who also prepared the final plans for the buildings and for the erection of the machinery. The work on the foundations was commenced in June, 1905, and the mill was completed and started in May this year.

The mill consists of three sections, each of which can be run separately. Each section has a storage bin connected with it, and in case of break-down in any part of the mill, it is thus possible to maintain the other units in operation. The passage of the ore through the mill is shown in the accompanying diagram.

CRUSHING

Before the ore is dumped in the crude-ore bin, which has a capacity of about 700 tons, it is weighed. From the bottom of the storage pocket the ore passes over a grizzly of manganese steel bars to a 24x30-in. Blake jaw crusher built by the Farrel Foundry and Machinery Company. The crusher has a weight of 31 tons. From the crusher which reduces to a size of about 5 in. the ore goes over a second grizzly to a Gates gyratory crusher No. 6K, which delivers it in size of 2 to 2½ in. to a conveyor belt, which also receives the fine material that has passed through the two grizzlies and brings it all up to a set of

CYLINDRICAL SCREEN, END VIEW

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†Mining Engineer, New York City.

40 by 30 in. rolls of Allis-Chalmers Anaconda type with enclosed rolls. The ore is here crushed down to 1 in. size and afterwards elevated to the top of a vertical dryer of a modified Rowand type. The ore drops a total distance of 40 ft. between cross-laid T-iron bars, meeting the gases and hot air coming from the furnace below. The furnace is located about 10 ft. above the bottom of the dryer. By this arrangement, and by letting in cold air at the feed outlet of the dryer, the hot and dry ore is cooled before it is delivered to the bucket elevator that brings it up to the second storage bin.

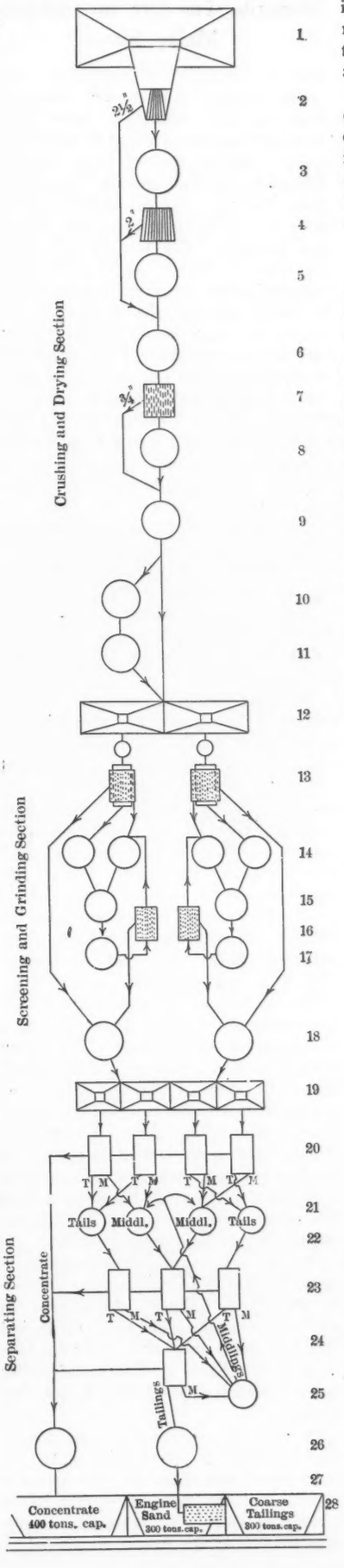
The sizing screens are fed from the bins by feed rolls. They are of the revolving cylindrical type with double jackets. They have no central shaft but rest on rollers and are driven by bevel gears at the discharge end. They are 16 ft. long and 4½ ft. in diameter. The inner shell is made of manganese steel plates ⅝ in. thick, with ¾-in. tapering holes. The outside jackets have ¼-in. holes. The over size and the ¾-in. material is delivered to crushing rolls 40x15 in. of the same type as the coarse rolls, and afterward passed over revolving screens with ¼-in. apertures. The oversize is returned to the rolls, while the ¼-in. material is elevated to storage bins over the separating section.

### MAGNETIC SEPARATION

The Ball and Norton double-drum magnetic separator is used exclusively. This machine is too well known to need description. The capacity of each separator is from 15 to 20 tons of crude ore. The middlings and tailings from the four primary separators are re-crushed on four sets of rolls and re-treated on a second row of four separators. The tailings from these four separators pass over a final machine in which the last traces of free magnetite are removed. The middlings from the last separator, as well as those from the four in the second row, are sent back to the middling rolls.

The final products, concentrate and tailing, are carried out of the mill on two 20-in. belt conveyors that run up an incline of 23½ deg. to the loading pockets. The concentrate pocket has a concentrate capacity of about 600 tons. The tailings pass over a revolving screen with ⅛-in. apertures which delivers each product into a bin with 200 tons capacity. The fine tailings have found good use as locomotive sand, being dry, sharp and clean. The coarse stuff makes excellent material for railroad ballast and for concrete sand. The particles are of uniform size and consist of sharp, clean grains. The sand has been used extensively for concrete at Lyon mountain, particularly in the construction of dwellings for the miners.

At one side of the mill is the motor room, separated from the mill proper by dust proof walls. It contains two 225-h. p. 1040-volts 3-phase current induction motors furnished by the General Electric Company. When the mill is once started, it requires only some 250 kw. to keep it running with full load. The current to the magnetic separators is furnished by a 50 h.p. motor-generator.




The mill as a whole is built with great care, with more consideration to first class work than to cost. Over the crushing machines and magnetic separators run overhead trolleys with chain blocks attached. Reserve parts to anything that may break down are close at hand.

### CAPACITY OF MILL

In the short time the mill has been running, no definite information has been obtained in regard to its full capacity, but there is no doubt that the estimate of 50 tons per hour will be permanently exceeded. The capacity of the plant is consequently known to be not less than that of the old mill, while only one half as many men are needed per shift, that is to say, 16 men. Of these, four work at the crushers and rolls, three at the magnetic separators, one as fireman for the dryer, one in the motor room, one as oiler and one as foreman. The rest of the crew is used for dumping the crude ore and loading, weighing, and sampling the fininshed products.

Samples of the crude ore are taken every hour. The concentrate is sampled both at the magnetic separators and at the place of loading in cars. Excellent results have been obtained in respect to the separation of magnetite from the tailings. Two years ago the tailings from the old mill used to carry 12 to 15 per cent. iron. By re-crushing and re-treating them on magnetic separators, this iron content was brought down to 6 per cent. In the new mill, with its more powerful rolls and more rational arrangement, the tailings are sent out with only 4 per cent. iron. The concentrate has an iron tenor of 63 per cent.

### GRADE OF THE ORE

Analyses of the crude ore, concentrates and tailings made by Mr. James Brakes, chemist for the mining company are given below. The samples were taken in January, 1906.

| | Crude Ore. | Concentrates. | Tailings. |
|---|---|---|---|
| Ferric oxide.....$Fe_2O_3$ | 31.48 | 60.128 | 4.57 |
| Ferrous oxide.....FeO | 15.81 | 28.850 | 3.60 |
| Manganous oxide.....MnO | .115 | .107 | .124 |
| Silica.....$SO_2$ | 33.16 | 6.880 | 58.56 |
| Alumina.....$Al_2O_3$ | 4.90 | .900 | 10.72 |
| Lime.....CaO | 4.96 | .660 | 8.24 |
| Magnesia.....MgO | 2.10 | .405 | 4.06 |
| Phosphoric acid.....$P_2O_5$ | .043 | .023 | .064 |
| Sulphur.....S | .027 | .022 | .033 |
| Titanic acid.....$TiO_2$ | .427 | .417 | .457 |
| Ferrous oxide (in gangue)..FeO | 2.83 | .257 | 4.76 |
| Potash.....$K_2O$ | 1.438 | .494 | 1.61 |
| Soda.....$Na_2O$ | 2.283 | .777 | 2.99 |
| Moisture.....$H_2O$ | .25 | .040 | .12 |
| | 99.823 | 99.960 | 98.910 |
| Iron total | 36.50 | 64.72 | 9.70 |
| Iron in magnetite | 34.30 | 64.53 | 6.00 |
| Phosphorus | .019 | .019 | .028 |
| Titanium | .089 | .083 | .096 |
| Manganese | .256 | .250 | .274 |

While the concentrates in the analysis above carries about 0.01 per cent. phosphorus, this represents the maximum.

While the concentrates in the analysis above carries about 0.01 per cent. phosphorus, this represents the maximum of the product as delivered.

The concentrates of Lyon mountain have their particular use in making low phosphorus iron. They are shipped in part to furnaces in Pennsylvania, and in part they are used in Standish furnace, located about five miles west of Lyon mountain on the Delaware and Hudson railroad. This furnace belongs to the Delaware & Hudson Company and is operated under lease by the Northern Iron Company. Its capacity is about 135 tons pig iron daily.

The company owns all the land around the mine and the village. All the dwellings are company property. Most of them were built of logs by the first owners of the mines, but they are rapidly being replaced by new ones. These are worth special mention for the reason that most of them are built of concrete on the monolith system. They are either double houses having two apartments with seven rooms each, or small single ones with five. The concrete is mixed in a ratio of 1 cement to 7 sand, which here, of course, consists of tailings from the mill. The cost of erection, everything included, hardly exceeds $100 per room. The houses are admirably suited to the climate of the country. A 2-in. air space in the middle of the wall helps to dry out the the building when first erected, and afterwards keeps it warm in winter and cool in summer. Seven of these buildings were completed and occupied last year and about 20 more will be ready for occupation before this fall.

Labor conditions have always been good, although a large percentage of the men are of the transient class. About 300 men are employed underground and 400 on the surface.

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The discovery of oil fields in the country along the Athabasca river and about 200 miles north of Edmonton, Canada, is reported. Reports of the Government experts sent into the dstrict show that there is an immense deposit of oil in the Athabasca district, and that it will, with proper development, become one of the greatest producers of the world. An American company has been formed recently for the purpose of working in the region. A drill will soon be installed upon the property secured by the company.

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According to Dr. R. W. Brock, prospecting at Rossland, B. C., requires the best technical skill, bold and courageous persistence, cool judgment, and ample capital. With the knowledge that has been gained regarding the character and modes of occurrence of the orebodies in this camp, with the present low cost of treatment, and with operations on a sane and business-like basis, the chances for success are vastly greater than in the earlier days.

## Monazite Tin Ore in Federated Malay States

The *Selangor Government Gazette* of Sept. 14, 1906, contains a report by the Imperial Institute staff on a specimen of washed alluvial tin ore from the land worked by the Sempam Tin Mining Company, Pahang. The ore consisted principally of a mixture of cassiterite, ilmenite and monazite. The last mineral was in the form of whitish opaque grains unlike ordinary yellow monazite such as is found in Brazil and in the Carolinas. The washed ore as received was found to contain tinstone equivalent to 50.86 per cent. of metallic tin, and 1.51 per cent. of thoria. The following is the complete analysis of the ore: Thoria ($ThO_2$), 1.51 per cent.; stannic oxide ($SnO_2$), 64.53; titanic oxide ($TiO_2$), 6.49; zirconia ($ZrO_2$), 0.48; ferric oxide ($Fe_2O_3$), 3.09; alumina ($Al_2O_3$), 0.24; cerium oxide ($Ce_2O_3$), 3.41; lanthanum oxide ($La_2O_3$) and didymium oxide ($Di_2O_3$), 4.38; manganese oxide (MhO), 0.36; ferrous oxide (FeO), 2.36; lime (CaO), 0.31; niobic oxide ($Nb_2O_5$) and tantalic oxide ($Ta_2O_5$), 2.86; silica ($SiO_2$), 2.44; phosphoric anhydride ($P_2O_5$), 3.54; loss in ignition, 0.81; total, 96.81 per cent.

The monazite was separated from the other constituents, first by magnetic means and finally by hand. The concentrate thus obtained was analyzed with the following results: Thorium oxide ($ThO_2$), 8.38 per cent.; cerium oxide ($Ce_2O_3$), 25.46; yttrium oxide ($Y_2O_3$), 2.80; lanthanum oxide ($La_2O_3$) and didymium oxide ($Di_2O_3$), 32.72; ferric oxide ($Fe_2O_3$), 2.78; aluminum oxide ($Al_2O_3$), 0.84; calcium oxide (CaO), 0.61; phosphoric anhydride ($P_2O_5$), 23.92; silicia ($SiO_2$), 0.92; moisture ($H_2O$), 0.14; loss in ignition, 1.14; total, 99.71 per cent.

The opacity of the grains of monazite is probably due to slight decomposition, as is indicated by the presence of 1 per cent. of water and by a deficiency of phosphoric acid, the amount of which is 24 per cent. instead of 28 per cent. as would be expected in a monazite of this class. A similar deficiency of phosphoric acid in relation to the rare earths present was also noted in a previous specimen of heavy sand from Tringganu which was sent to the Imperial Institute by the Government geologist.

The proportions of the principal constituent minerals in the sample are approximately as follows: Cassiterite, 65 per cent.; ilmenite (including rutile and magnetite), 16; monazite, 13; columbite, 3 per cent. Small quantities of other minerals were present but were not estimated.

By magnetic concentration the constituent minerals of this tinstone sand can be separated, and if this be done both the tinstone and the monazite would be of commercial value. If, however, the ore were smelted in its present condition the monazite would be lost in the slag. In view of the fact that the monazite is rich in thoria, its separation from the sand on a commercial scale is worth consideration. Taking the market price of tin at £180 per ton, the value of this ore as a source of tin is about £80 per ton in its present condition. The concentrated monazite would be worth, at the present rate, about £37 per ton.

## Phosphate Rock in Algeria

According to a recent British consular report, the principal deposits of phosphate rock in the province of Constantine, Algeria, may be divided into four groups: (1) District of Tébessa; (2) district of Sétif; (3) district of Guelma; (4) district of Aïn-Beïda. The beds intermingled with Tertiary layers resembling Eocene phosphate of lime appear under two different aspects: in a state of nodules or in a state of rock phosphate found in regular layers over a length of several miles. The rock phosphate extracted is of two qualities: No. 1, containing 63 to 70 per cent. phosphate of lime; No. 2, 58 to 63 per cent.

The mines of Djebel-Kouif, situated 16 miles from Tébessa, at nearly 5000 ft. above the level of the sea, previously belonged to a British company, but were sold to a French company six years ago for £200,000. A private railway of 18 miles connects these mines with the ordinary railway line at Tébessa. The phosphate is principally extracted from open quarries, gallery work only being adopted when it becomes too expensive to decapitate the mountain so as to uncover the phosphate. The beds of varying thickness cover an area of about 12 miles.

The cost price of the phosphate on trucks at Tébessa station is about 4s. per ton. This includes extraction, drying, and transport from the mines to Tébessa. The cost of carriage from Tébessa to Bône—6s. 2d. per ton—is further increased by the necessity of transshipping the phosphate at Souk-Ahras from the narrow-gage line of Tébessa into the trucks of the broad-gage line between Souk-Ahras and Bône. Altogether, the cost of a ton of phosphate on quay at Bône is from 11s. to 12s.

Since 1893 the shipments of phosphates have been as follows: 1893, 5118 metric tons; 1894, 45,957; 1895, 115,044; 1896, 143,098; 1897, 220,617; 1898, 248,721; 1899, 285,044; 1900, 296,984; 1901, 269,125; 1902, 304,757; 1903, 320,054; 1904, 285,741; 1905, 322,327 metric tons.

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Siemens & Halske, of Berlin, have taken out a patent for employment of tantalum in manufacture of steel, with a view to the improvement of tools requiring special hardness and ductility.

# GOLD MINING AT WEI-HAI-WEI, CHINA

## Description of an Ore Deposit and Mining Conditions in a Remote Country

BY W. DENHAM VERSCHOYLE*

From time immemorial active mining operations have been carried on by the Chinese in the district surrounding Wei-hai-Wei, which is now under British jurisdiction. In many of the streams considerable placer mining has been done, as also on many terraces and hills, but, whatever they may have been in the past, present-day operations are spasmodic and unsustained, and generally dependent on the rainfall, as it affords a bare river bed or a transient supply of water for primitive gravel washing. Quartz mining has been carried on in many places; oxidized ore carrying free gold and argentiferous galena being the ores most sought after. Underground work does not appear to have been carried on anywhere on a very large scale. Hammer and moil, fire and cold water, were the agents employed by the "old men" in their sinking, drifting and stoping operations. The ground was held up, where necessary, by filling with the ore and waste that was sorted out in the stopes, these being in many cases so narrow that a foreign miner of ordinary dimensions has great difficulty in getting into them at all. The ore was generally broken small by hand, and then pulverized in rough stone mortars, or in a bean mill, which consists of a circular flat stone about 5 ft. in diameter, laid horizontally on a built-up bed 2 or 3 ft. high. In the center of this flat stone was fixed a wooden pivot, around about which a conical stone roller revolved, the power being derived from men, women, mules or donkeys, walking around the circular bed rock, dragging the roller after them. The subsequent metallurgical operations consisted in panning out the free gold, sometimes with quicksilver, and concentrating in wooden bowls. The concentrates were generally allowed to weather and were then retreated.

GENERAL VIEW OF MILL

### THE WEI-HAI-WEI GOLD MINING COMPANY

The Wei-hai-Wei Gold Mining Company, Ltd., the only foreign mining company at present operating in the district, is working on a vein, the outcrop of which had already received considerable attention from the old Chinese miners. This company made the mistake of ordering its mill of 20 stamps, with power for 40, before any real development had been done, the result being that after less than three months' work the mill was forced to close down for want of ore. It was at this stage that I took hold, having recommended a vigorous development campaign of 9 to 12 months, which has resulted in a considerable brightening of the outlook. Although the major part of the information obtained during this term is of a private nature, some which is not may be of interest.

### SITUATION OF THE MINE

The mine is situated among low hills at an altitude of about 500 ft. above sea level and distant 10 miles from Wei-hai-Wei, with which it is connected by means of a good wagon road, eight miles of which has been constructed by the British Government and two miles by the mining company. The entire district is traversed by native roads and trails, but these are generally unsuitable for the transportation of heavy freight; the same conditions are prevalent throughout the greater part of China.

In the immediate neighborhood of Wei-hai-Wei, and, as far as I have seen, throughout the British concession, the rocks are of volcanic origin, mainly granite, frequently traversed by later intrusions of a more basic character.

Diagram No. 1 shows a horizontal sec-

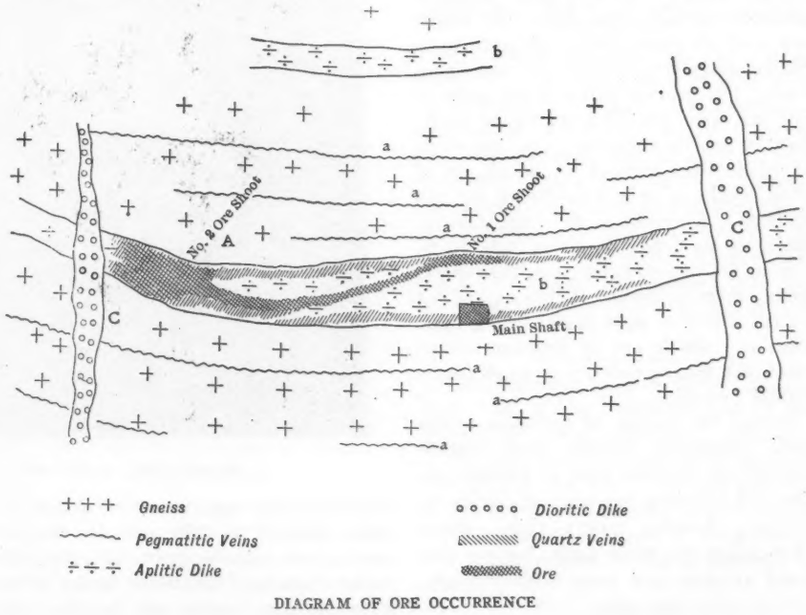


DIAGRAM OF ORE OCCURRENCE

*Consulting mining engineer, Ballisodare, County Sligo, Ireland.

tion of the formation at the 200-ft. level in the immediate vicinity of the Wei-hai-Wei Company's main shaft.

GEOLOGICAL CONDITIONS

The country rock is metamorphic gneiss, which has been subjected to severe straining and fracturing, resulting in the formation of the system of veins and dikes as shown. The series *a a a*, apparently of pneumatolitic origin, while preserving certain characteristics as to strike and dip, vary considerably as to their filling at different points. In places where erosion has not been rapid the carbonic acid of the surface waters has kaolinized the wall rocks for 3 or 4 in. on each side of the original fissure. At other points a coarse grained pegmatite constitutes the filling, and at others quartz with wolframite, tourmaline, magnetite, siderite and other minerals. The general strike of the series is east and west, the dip being to the north. Next in genetic sequence comes the series of aplitic dikes marked *b b*, which are of great length, 3 or 4 miles being not uncommon. They have the same general strike as *a a a*, but dip from 52½ to 65 deg. in the opposite direction, thus intersecting them in depth. Both *a a a* and *b b* are cut almost at right angles by the basic dikes *c c*, which are of frequent occurrence, but apparently only of small longitudinal extension.

During the cooling of the main aplitic dikes contraction fissures were formed intersecting the dike rock at various angles and allowing ore-bearing liquids to circulate, forming quartz veins, which often follow the main walls, but are also found as spurs and cross veins throughout the main dike mass.

SECONDARY SILICIFICATION

Subsequent to the primary silicification which is evidenced by these veins a bending movement took place at the point marked *A*, which caused a buckling and fracturing of both the dike and the quartz veins and allowed of a still more copious circulation of ore-bearing waters. This resulted in the replacement of almost the entire body of the dike and also the primary quartz veins by quartz of a very different character. Unaltered blocks of the bluish primary quartz and the dike rock are frequently found inclosed in the white secondary quartz, which also often affords interesting examples of crustification and banded structure where the silicious waters have been following open channels, which are found occasionally 1 to 2 ft. wide.

This secondary silicification has resulted in the formation of an orebody over 20 ft. wide, which, taken in 4-ft. sections, gave an average assay value for the full width of $9. Sufficient development work has not yet been done to determine the length of either the vertical or horizontal axis of this orebody. The intense metamorphism of the country rock, as well as the dike, points to a thermal and therefore deep-seated action, and it would therefore appear not unreasonable to expect that the body will continue to a considerable depth.

NO. 3 SHAFT, WITH BLOWER

CHARACTER OF THE ORE

Auriferous pyrites, galena and chalcopyrite are the principal valuable minerals met with in both the primary and secondary quartz, the latter, however, containing the more free gold. In both diallage is found, sometimes in considerable masses, and also salmon-colored orthoclase, which generally represents an unreplaced portion of the original dike. Chalybite and graphite are frequently found as deposits in cracks and interstices of the dike rock.

No. 1 ore shoot (see diagram 1) contains some very heavy sulphide ore, which seems to be due to secondary enrichment by descending surface waters, the indications being against its continuance to any great depth. In the No. 2 shoot a heavy streak of ore about 10 in. wide assayed $70 and would appear to be a valuable find, as

HEADFRAME, BLACKSMITH SHOP, HOIST HOUSE, ETC.

it occurs in the middle of a large body of ore that seldom assays less than $5.

MINING AND MILLING

Owing to the strong hanging wall found throughout the mine, the mining of these orebodies will be a very simple matter, which is fortunate as there is absolutely no local supply of timber. Yalu river and Japanese pines have to be imported, but owing to the poor character of this lumber, for any permanent work Oregon pine is the most suitable.

IN THE STOPE, SHOWING ICE

The treatment of the ore is as yet an unsolved problem. The present mill, consisting of a breaker and Allis-Chalmers 20-stamp mill, with Union vanners, does not offer a complete solution.

CYANIDE EXPERIMENTS

I experimented for some time with the cyanide process with very poor results. A small test plant, the first in China, I believe, capable of treating a 2-ton charge was erected and a trial was made on some old concentrates, the mill not being in operation at the time, but even with most careful washing, neutralizing and aëration with compressed air, and frequent turning, a very low extraction was attained, and not as high as had been obtained in the laboratory. Subsequent laboratory experiments on fresh concentrates, grinding to about 150 mesh and agitating with different solutions and under various conditions, resulted eventually in a satisfactory extraction being obtained. These experiments indicated sliming, agitation and filter pressing of concentrates as being probably the correct method of treatment, a result which was also subsequently obtained by a prominent firm of metallurgists in San Francisco.

In view, however, of the small amount of development in the mine and the possibility of change in the character of the ore, and especially in the percentage of copper, it was at present decided to ship the concentrates to American smelters, their treatment charges comparing favorably with anything attainable in Japan.

WORKING COSTS

The power used in the mill and about the mine is derived from coal, and this represents one of the most serious items in the bill of costs. Chinese and Japanese coal is used, delivered at the mine from Wei-hai-Wei on Chinese wheelbarrows, which handle about 400 lb. per trip.

Labor fortunately is cheap, which alone makes it possible to work low-grade ore. The general scale of wages for 10 hours' work is about as follows, the men finding their own board and lodging:

| | |
|---|---|
| Muckers | 15c. gold. |
| Miners | 20c. " |
| Tool sharpeners, carpenters | 15—25c. " |
| Firemen, engineers | 25—50c. " |

Contract prices on rock work vary, of course, with the character of the rock, but generally approximate the following:

| | Per Foot. |
|---|---|
| Main shaft, incline 58°, single track and ladder-way, rock work only | $5.00-$7.50 gold. |
| Main levels | 3.50- 5.00 " |
| Other cross cutting and drifting | 2.00- 3.50 " |
| Winzes and rises | 2.50- 5.00 " |

Contractors deliver broken rock in skips or buckets in shafts or winze, and shovel back from face in tunnels. They pay for all stores used, but tools and steel only if lost or wasted.

As a general rule the day men work well if carefully supervised, and if given a definite task or contract, will work very hard. The supply of labor is so great that it will be possible and, I believe, necessary to lower the above scale of wages still further.

The British Government is responsible for the maintenance of order within the territory. The natives are, however, a very peaceful and law-abiding people, petty thieving being the offense which has most often to be punished. Land titles are obtained direct from the British commissioner. There is no doubt that were the same security of title and unrestricted labor conditions obtainable in other parts of China, many good mines would be opened up, and there would be a considerable influx of foreign capital; but it will probably take many years to bring about a material change in the adverse conditions which at present obtain, and so for the present this vast country must remain practically closed to the foreign engineer.

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The official statistics of the Grand Duchy of Luxemburg show that in 1905 the 75 mines in operation produced 6,595,860 tons of iron ore, valued at 2½fr. per ton, and afforded employment to 6278 workmen. There were 32 blast furnaces in operation; they produced 1,368,251 tons of pig iron, and afforded employment to 3728 workmen. The eight foundries produced 13,628 tons of castings, and the three steelworks produced 397,942 tons of steel.

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At a meeting held at Essen on the Ruhr, Oct. 5, the representatives of the five miners' unions agreed to demand a 15 per cent. rise in wages in all the German mining districts. This demand will be addressed through the unions collectively to the organizations of mine-owners and to the various boards of directors of mines.

## The Belt Conveyer in Cyanide Plants

In the cyanide plant recently built jointly by the Knights Deep and the Simmer & Jack East, on the Rand, the Jeffrey belt conveyer is extensively utilized, both in charging the vats and in disposing of the tailings.

In this plant a space of 170x470 ft. is occupied by 40 leaching tanks, each 40 ft. diameter by 9 ft. deep, arranged in four rows of 10 tanks each. Above these are 16 similar "collecting" tanks, which are placed concentric with leaching tanks Nos. 4. 5, 6 and 7 of each row. Over the leaching tanks, and below the collecting tanks, there are four 20-in. rubber-belt conveyers, one over each row, driven by separate motors. These conveyers distribute the material from the tanks above to those below.

JEFFREY BELT CONVEYER

Beneath each of the four rows of leaching tanks, and directly under the four conveyers above mentioned, there are four 20-in. rubber-belt conveyers, each with 426-ft. centers, running over three-pulley troughing idlers, 4-ft. centers. These conveyers are fed with leached residue through a small opening in the center of the bottom of each tank and carry it to one end of the row of tanks, delivering to two cross conveyers at right angles. These conveyers face each other and concentrate all the tailing at one point. It is then delivered to a 30-in. rubber conveyer, which in carrying it 310 ft. elevates it 20 ft. into a 50-h.p. motor house at the edge of the dumping grounds, as shown in the accompanying illustration.

At this point the material is delivered to the eighth and longest belt of the system, a 30-in. 6-ply 3/16-n. rubber-covered Century belt, 430-ft. centers, which carries the tailing to the top of the dump, a rise of 122 ft. from the first conveyers under the tanks. The sand is then delivered to the ninth conveyer, of the same pattern as the inclined one, but only 125 ft. long and carried on a horizontal, portable wooden frame. By moving this in an almost complete circle about the head of the inclined conveyer the pile can be evenly extended. As the labor of moving this portable conveyer is too great to be performed daily, there is placed at the head of this last conveyer a distributing boom of two 36-in. conveyers, all self-contained within a portable steel frame. The first of these is merely a 30-ft. extension of the last, shown in the upper left-hand corner of illustration, while the second, 56 ft. long, is at right angles to the movable belt. This last boom conveyer is on rollers in the steel frame so that it can distribute material 56 ft. to right or left of the structure, being fed through a three-way hopper capable of loading material on the advance belt, or to right or left on the crossbelt. In time the ninth conveyer will be lengthened from 125 to 450 ft. With the present system a plateau an eighth of a mile in diameter and 120 ft. high may be built before it will become necessary to change the present system of conveyers below to the top of the tailing heap.

## Cobalt and Chrome Mines of New Caledonia*

The cobalt deposits of New Caledonia occur as irregular impregnations in large masses of ferruginous clay resulting from decomposition of certain serpentine rocks. The mineral is in form of cobalt oxide, associated with nickel oxide and pyrolusite, of bluish-black color and earthy aspect, known as asbolite. The deposits are never extensive and can only be mined on a small scale by isolated miners with limited means, who are styled "cobalteurs." The percentage of the ore generally varies from 4 to 6 per cent. A 4 per cent. ore sells in Noumea for 250 francs per metric ton. The annual production of New Caledonia amounts to 2500 to 3000 tons from about 30 mines.

The chrome deposits are of two kinds: Some are in vast superficial masses of ferruginous clay and contain very rich ore, soft and easy to separate; others are in form of masses inclosed in the hard serpentine. L. Bernheim founded the "Société Le Chrôme," with a capital of 3,800,000 francs, to develop this industry. Today the company owns a mining estate of 60,000 hectares, comprising 6000 hectares of final concessions, 6000 hectares applied for, and 48,000 hectares prospecting areas. This estate consists of three chief groups; one is in the north of the island, and includes the Tiebaghi mine, leased to a London firm. This mine contains a very fine bed, giving ore with as much as 57 per cent. sesquioxide of chromium; production, 4000 to 5000 tons of ore per month. A second group lies 20 km. south of Noumea and comprises the "Lucky Hit," where a vein with maximum thickness of 15 m. is mined. The ore, giving 30 to 40 per cent. of chromium sesquioxide, is enriched in a special works, and the mine, the only chrome underground mine in the island, can now produce 12,000 tons annually. A third group in the south is not yet mined. A railway is being constructed to enable work later.

The exports of chrome ore have continued to increase since the foundation of the "Société Le Chrôme;" in 1902 the productioin was 10,000 tons; it is estimated that the production in 1906 will be 60,000 tons. Two-thirds of the total is shipped to the United States.

*Notes from an article in *Comptes Rendus* de la Société de l'Industrie Minérale, August, 1906.

## Production of Borax in 1905

The production of borax, says Charles G. Yale, of the United States Geological Survey, in his report on the output of that mineral during 1905, is now almost entirely confined to the State of California, and to the counties of San Bernardino, Inyo, and Ventura in that State. Only small quantities are occasionally taken from the marshes of Nevada, where a little work is carried on during the summer months. The total output of crude borax for the year 1905 was 46,334 short tons, valued at $1,019,154, as against 45,647 tons in 1904.

According to *Rassegna Mineraria*, Sept. 1, 1906, recent prospecting has confirmed the existence of a deposit, covering a considerable area, of textile asbestos in Monte San Vittore, near Lanzo Torinese, Italy. There is a deposit about 400 m. long, 300 wide and 100 thick, in which the proportion of textile asbestos exceeds 5 per cent., while the short-fiber asbestos amounts to 25 per cent of the total rock.

The quantity of building sand used in the United States in 1905 is estimated at 10,127,150 tons, and the value at $4,284,270. This includes all sand used in construction of buildings.

# THE RELATION OF BAROMETRIC PRESSURE TO MINE EXPLOSIONS

## A Suggestion that Explosions of Gas may be Guarded Against by Attention to Meteorological Conditions

BY F. W. PARSONS

The question as to whether coal-mine explosions are in any way explained by the outside atmospheric pressure is one that has received little attention at the hands of engineers and others interested in the subject. There are many explosions in mines, due to causes other than the firing of an accumulated body of gas. The two more common causes are blown-out shots and the improper or careless handling of powder and dynamite. It is also known that a fall of roof may create a concussion sufficient to cause an explosion; but as a general thing, such explosions are usually local.

The two elements making a coal mine dangerous are dust and gas. The more serious explosions occur in mines where the workings are not only dry and dusty, but also the seam is gaseous. Certain coals form a dust that makes an explosion highly destructive, while in other districts the coal dust never seems to enter into the explosion at all. The dust formed in our New River and Pocahontas mines is especially inflammable, and explosions in these districts have been most appalling.

As a general rule, a mine is said to be gassy on non-gaseous, and when an explosion occurs, it is nearly always due to an excessive flow of gas into some part of the mine. In nearly all cases, the fan is running as uniformly and pulling as much air at the time of the accident, as at any other moment, proving that the disaster is not due to a slackening in the air current.

Believing that in some small way the outside atmospheric pressure influences the flow of gas into a mine, I have investigated the pressure given by the Weather Bureau at certain localities when explosions have occurred. The results of these investigations are sufficiently interesting to justify their publication, although I do not contend nor claim to have established any definite relationship between mine explosions and barometric pressure.

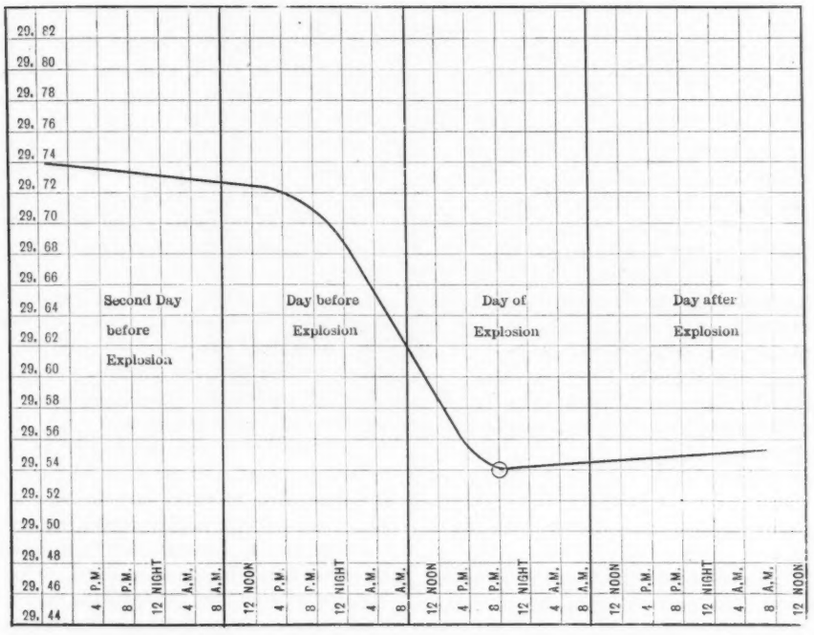


DIAGRAM SHOWING AVERAGE BAROMETRIC CHANGE

In studying the problem, it is of course necessary to try to eliminate all explosions that are known to have ignited from causes other than an unusual and excessive flow of gas into the mine. It is also necessary first to investigate and see if the pressure underground varies as the outside pressure. This fact is readily evident provided the fan revolves at a uniform speed, which is nearly always the case. One law, established and accepted, is that the pressure created by a fan varies as the square of its speed; if the speed is doubled, the pressure increases fourfold. It is also true that the volume of the air delivered is directly proportional to the speed. This being true, it remains that if the speed of the fan remains uniform, the pressure in the mine is also constant, and is only influenced by the outside atmospheric pressure. As a consequence, when the outside barometer is low, there is a release of pressure in the mine which may permit occluded gases to flow into the workings, considerably increasing the liability of an explosion.

In collecting data bearing upon this subject, I have selected at random a number of explosions that have been caused by gas, or at least aided by an excesssive quantity of gas present. The diagrams on file at the Weather Bureau in Washington, showing the hourly fluctuations of the barometer at the various stations, were consulted, and appear to indicate that all the explosions occurred when the barometer was falling.

In some instances, the decrease in pressure is very pronounced, while in one or two cases, the fall is slight. None of the explosions occurred on a rising barometer. Another fact is clearly evident, viz., that the hight of the barometer at the time does not matter, the influencing factor being solely the decrease in barometric pressure, irrespective of whether the barometer is 30 in., 28 in., or showing some other hight. The barometric readings at points distant from Government stations were secured by interpolation, it being found that the readings over these limited areas differed little from the readings at the stations.

The brief results here enumerated show the average pressure before the explosion, and also the barometric reading the day of the accident. These readings for 10 explosions were averaged each day and the curve shown in the diagram, Fig. 1, plotted from the resulting averages.

The following tables show roughly the barometric changes at certain localities before and after explosions:

**At Zeigler, Ill., Apr. 3, 1905.**

| | | |
|---|---|---|
| Apr. 1 | Barometer | 30.24 |
| Apr. 2 | " | 30.10 |
| Apr. 3, explosion | " | 29.88 |
| Apr. 4 | " | 29.96 |

**At Birmingham, Ala., Feb. 20, 1905.**

| | | |
|---|---|---|
| Feb. 18 | Barometer | 30.20 |
| Feb. 19 | " | 30.50 |
| Feb. 20, explosion | " | 30.26 |
| Feb. 21 | " | 30.26 |

**At Tercio, Colo., Oct. 28, 1904.**

| | | |
|---|---|---|
| Oct. 26 | Barometer | 30.42 |
| Oct. 27 | " | 30.30 |
| Oct. 28, explosion | " | 30.18 |
| Oct. 29 | " | 30.18 |

**At Rush Run, W. Va., Mar. 18, 1905.**

| | | |
|---|---|---|
| Mar. 16 | Barometer | 30.48 |
| Mar. 17 | " | 30.32 |
| Mar. 18, explosion | " | 30.00 |
| Mar. 19 | " | 30.00 |

**At Kayford, W. Va., Apr. 20, 1906.**

| | | |
|---|---|---|
| Apr. 18 | Barometer | 30.16 |
| Apr. 19 | " | 30.36 |
| Apr. 20, explosion | " | 29.98 |
| Apr. 21 | " | 29.71 |

**At Maitland, Colo., Feb. 19, 1906.**

| | | |
|---|---|---|
| Feb. 17 | Barometer | 25.55 |
| Feb. 18 | " | 25.50 |
| Feb. 19, explosion | " | 25.12 |
| Feb. 20 | " | 25.37 |

The disastrous explosion that happened in the Harwick mine at Cheswick, Penn-

sylvania, Jan. 25, 1904, killing 179 men, occurred at a time when the barometer was falling. On the morning of the fateful day the thermometer registered 30.50 and during the day fell one-half inch. The explosion at Pocahontas, Va., Oct. 3, 1906, also happened at a time when the center of an area of low pressure was near. Although the barometer fell but 0.07 in. during the day, there had been a considerable decrease in pressure previous to that time.

Two serious explosions happened last month (October): the Wingate explosion in England and the disaster at the Rolling Mill mine near Johnstown, Pennsylvania. Early advices from the English mine tell us definitely of a period of low atmospheric pressure just previous to the explosion. The barometric pressure recorded for Johnstown on Oct. 23 was 30.12 in.; on Oct. 24, in the morning the barometer read 30.00 in.; when the explosion occurred in the evening of this same day, the barometer had fallen to 29.70 in., and had again risen on the morning of the 25th to 29.88 in.

In continuing investigations along this line it is necessary that a series of careful barometric readings be taken underground simultaneously with barometer observations on the surface. A comparison of these data will determine more definitely how close the atmospheric pressure in the workings follows the outside variations.

If changes in barometric pressure do influence mine explosions and create periods of greater danger, could not the United States Weather Bureau, with its wonderful organization, render a great service to miners and the mining industry in general? The approach of storms is heralded along our shipping ports and has proved of value to our seamen. In a similar manner, the movements of areas of low barometric pressure could be forecasted and extra precautions taken during these periods. The more gassy places could be shut off, the speed of the fan changed and conditions generally be made safer. No one preventive act that can be thought of will eliminate mine explosions. On the other hand, a strict observance of the many precautions now generally known will undoubtedly tend to reduce these accidents and place the lives of our miners in less jeopardy.

In conclusion, I trust that other engineers and mine managers who have already made determinations along these lines, whether favorable or unfavorable to the theory here advanced, will add their ideas to those here produced and help solve one of the many problems that confront coal-mining engineers.

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The Turkish Government has decided to reduce the royalty on chrome ore, which is now four pounds (Turkish), in order to enable this product to compete successfully with that of New Caledonia.

## Coal in Alberta

BY PHILLIPS THOMPSON

J. B. Dowling, of the Canadian Geological Survey, who has been at work during the season in the Rocky Mountain coalfields in Alberta, reports to the Survey at Ottawa announcing valuable discoveries of bituminous coal. Mr. Dowling was commissioned to trace the anthracite coal area northward from the main line of the Canadian Pacific. It was believed that the Kootenay formation containing the coal seams of Fernie, Canmore and Bankhead, did not reach the Saskatchewan basin. Mr. Dowling, however, has traced these formations past the Brazean river to within 70 miles of the Yellowhead pass. In his report he states that the coal basins of the Rocky Mountains are not in continuous stretches, but depend on the foldings of the mountains. The Cascade basin has been traced to within 14 miles of the Saskatchewan river. Between the Red Deer and Clearwater rivers a section of the measures gives 24 seams of which 15 are over 4 ft. thick, the workable coal amounting to a total of 95 ft. Between the Saskatchewan and the Brazean river an outer range of mountains called the Bighorn range brings up the coal measures again on the south side of the Saskatchewan in the foothills. Here the coal measures reach the surface, and are exposed in a small ravine rising from the river opposite the limestone range. In this locality three seams were found in what is evidently the top of the formation; one of these is 5 ft. in thickness, overlaid by shale about 5 ft. thick, above which is 3 ft. of good coal. The other two seams were not of workable thickness. On the north side of the river the seams were lifted much higher, and coal measures underlie at no great depth all the interval between the Bighorn range and the main Rockies. The Bighorn river cuts through and exposes many seams, most of which, however, were crushed and dirty.

The most noteworthy discovery was that of exposures farther north on streams breaking through the Bighorn range in the vicinity of the Brazean river. Here the seams observed on the Saskatchewan were also found, and a 16-ft. seam was uncovered. The coal has not yet been analyzed, but trials in an open fire show that it is not anthracite, as it burns with a luminous flame, and with some smoke and coke. It may be roughly classed as steam coal of a grade between the Fernie bituminous and the anthracite of Canmore. The formation is continuous, occurring again on the north side of the Brazean. Limitations as to time and working force necessarily restricted Mr. Dowling's explorations to the easiest exposures.

The special value of these results of the expedition is in connection with the projected construction of a railway through the Yellowhead pass, which will call for a coal supply of good quality. Mr. Dowling pronounces the coal of the Brazean district well adapted for this purpose.

## Mine-gas Detector

The latest apparatus for detecting the presence and volume of fire damp, or other gas common to coal mines, has been patented in England by J. McCutcheon, of Edinburgh.

The instrument comprises a U-shaped tube, the right limb of which is connected at the bottom with a third vertical tube, the connecting tube being provided with a stop-cock. The latter tube has an enlargement above the level of the U-tube, and, above this, is connected to an india-rubber ball provided with a tap or valve. In the left limb of the U-tube is a float connected above with a rod of aluminum, the rod terminating in a metal disk coated with platinum foil. This disk is directly opposite the spring terminal of a wire which is connected to one pole of an electric battery, and also to a scale on which the percentage of fire damp is indicated; the rod of the float carries a small platinum wire dipping into a cup of mercury connected with the other pole of the battery.

An electric bell or other alarm signal is included in the electric circuit. A mobile liquid, preferably "azine" (paraffin or other mineral oil treated with a vegetable coloring matter), is introduced into the U-tube and the other vertical tube, then the stop-cock between the latter and the U-tube is closed, and the india-rubber ball is compressed to expel air through the valve, which valve is then closed. On now opening the tap between the U-tube and the other tube, the liquid in the U-tube is drawn partly into the latter by the vacuum in the india-rubber ball, the float in the U-tube descends and the electric circuit is broken. The right limb of the U-tube carries at the top a vessel of unglazed earthenware, provided with a tap. If fire damp or other light gas be present, then, owing to endosmose action, the liquid in the U-tube is forced down in the right limb, and up in the left limb, the float rises, the electrical circuit is closed, and the bell rings.

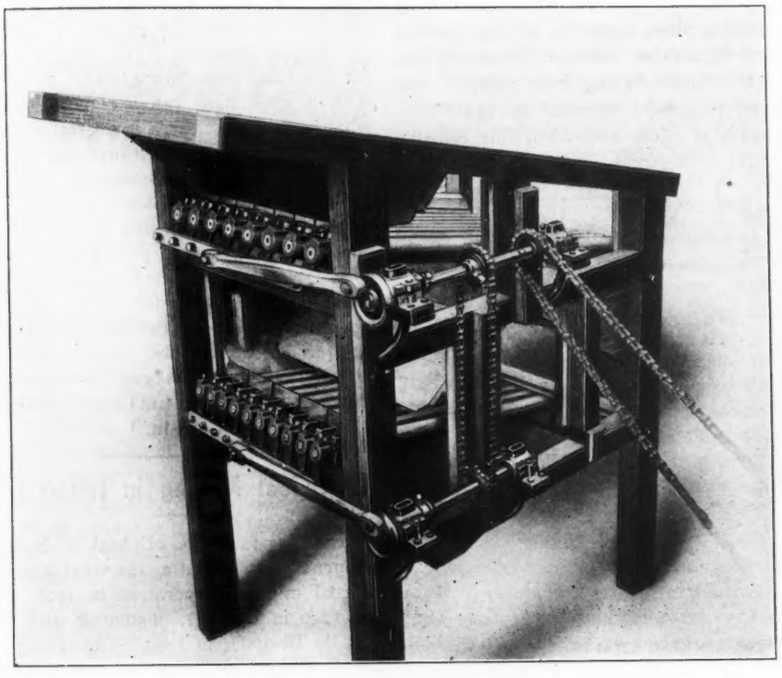
## Coal Briquets in Belgium

According to James McNally, U. S. consul at Liège, the briquet industry of Liège has become important, the exportation for the first seven months of the present year amounting to 253,911 tons, of which France received 110,036, United States 46,700, and Germany 32,514. In 1905 the Belgian State railways consumed about 250,000 tons. The domestic use of briquets is increasing yearly, many persons using them for kitchen stoves as well as for furnaces.

## A Unique Coal Screen

BY F. W. PARSONS

There is no phase of coal mining so important to the operator as the adoption of proper methods for handling the coal. There are many mines in America where the coal is not dumped from the time it enters the car in the room or working place, until it is thrown on the screen or chute leading to the railroad car. The managers of these mines know that their coal could be handled cheaper and in greater quantity if monitors, self-dumping cages, or other labor-saving devices were installed; still the fact that the coal may be more broken deters them from adopting such improved methods.



OSCILLATING ROLLER COAL SCREEN

At the majority of coal mines in this country, the system of handling the product includes some method of screening to separate the coal into the various sizes, known as lump, egg, nut, pea, slack, etc. In carrying on this operation, various kinds of apparatus are installed. In some cases the screens are made of steel plates, with round perforations; at other plants, the plates are replaced by bars, or heavy wire cylindrical screens are used. The screens are always placed on an incline, varying from 10 deg. for shaker screens to 30 deg. for gravity screens. Where separators of the latter type are used, the objectionable feature is that the initial point of dumping must be placed at a high elevation above the railroad tracks. With shaker screens, which are most commonly used, the disadvantage lies in the terrific jar and constant strain to which the tipple is subjected. In order to counteract the wear and tear due to shaker screens, it is now frequently the practice to construct the screens with supports entirely free from the remainder of the tipple building. When this is done, the entire structure is not so badly injured, and the screen supports can be replaced after the original timbers have been loosened and strained. While traveling through Illinois, I examined the model of a new kind of screen recently patented. The accompanying illustration shows a small working model as it stands completed. The idea is one that contains many excellent points, and seems to overcome the numerous objectionable features generally found in gravity and shaker screens. The device runs without any perceptible jar, and does not catch, clog nor break any of the coal.

The apparatus consists of a number of steel rollers placed parallel and lengthwise in the direction of the travel of the coal. These roller bars lie on an incline and have an oscillating motion, which causes all the coal to move along the screen uniformly and without breakage. Wet coal will travel over the bars as easily and uniformly as the dry product. In constructing and installing this coal separator, little bracing is required since the action of the rollers eliminates any jar or shaking.

Any reasonable number of sizes can be obtained by having the rollers a certain diameter for half their length, and a smaller diameter the other half. This increases the size of the aperture between the bars for half the length of the screen, which allows a different size of coal to go through.

The inventor of this screen, W. O. Gunckel, has also a large practical separator installed in his workshop at 1721, South Seventh street, Terre Haute, Indiana. This large screen is an exact duplicate of the small model here shown, and is used to demonstrate practically the action of the device when coal is dumped upon it. The driving arrangement of the large separator is slightly different from the scheme shown in the illustration, but the fundamental principle is precisely the same.

The illustration plainly shows the cups for oiling all friction parts, while at the upper end is the hopper chute where the coal is fed upon the rollers. The capacity of the machine is very large and the cost of installation is said by the inventor to be less than the screens at present installed.

The subject of screening coal being one of such vast importance to the operator, and the present method of separation having so many objectionable features, any new device that tends to perfect present practice is very acceptable to all those interested in coal mining.

## A Modern Coaling Station

Engineers for the Southern Railway are constructing a coaling station at Asheville, North Carolina, which is the first of its kind in this country in several respects, one of them being that it is constructed throughout of concrete reinforced with corrugated steel bars.

The structure is 64 ft. in length, 40 ft. in width and 85 ft. 6 in. in hight and has on the west side a receiving hopper 15x18 ft. The total capacity is about 1000 tons of coal, and in addition the structure has a sand-storage room capable of containing 100 tons of wet sand and 15 tons of dry sand.

A track runs to the receiving bin to unload the coal there, and from this bin the fuel is taken up an elevator shaft by buckets operated along an endless chain to the large storage bin which will contain 1000 tons of the fuel. The loading capacity is about 100 tons per hour, the elevator being driven by a powerful alternating-current electric motor. A 5-h.p. Westinghouse motor also operates the air compressor. Ten tons of sand per hour can be automatically loaded on the sand elevator, which is driven from the drive shaft of the coal elevator.

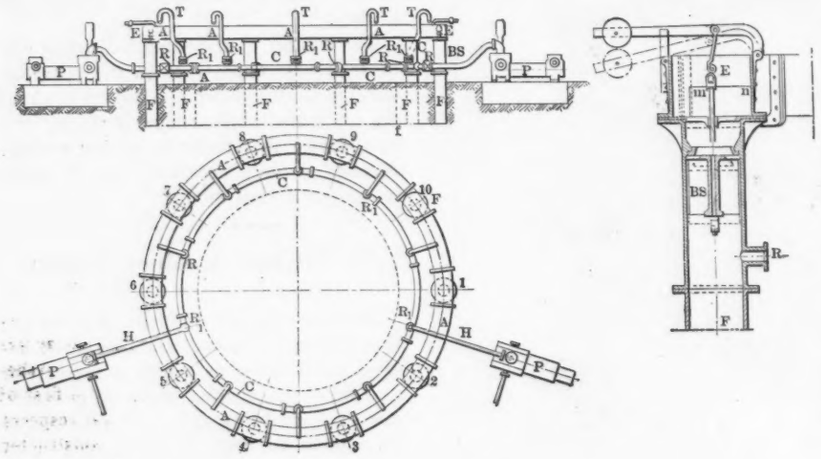
Two tracks have been constructed under the coaling station, so that when it is desired to coal an engine, it is only necessary to lower the coal chute, and by the pressure of a lever allow the coal to run down, a tender being loaded in this manner in a very short time.

The station is equipped with 10-ton suspension scales, fitted with plus and minus beams and automatic registering device, so that coal may be weighed as taken on the engine.

## Sinking Shafts by the Cementing Process*

BY H. SCHMERBER

The engineering staff at the Anzin colliery have devised a form of apparatus for use in the sinking of pits by the cementing process, in which liquid cement is forced under pressure into the fissures of water-bearing strata, in order to keep back the water from entering the shaft in course of sinking. A number of boreholes *F* are driven around the site of the pit as far as the water-bearing strata and lined with casing. At the head of each casing is attached a valve chest *B S*, and these in turn are surmounted by troughs *E*, supporting the valve levers fitted with diaphragms *m n*, the troughs and connections *A* forming a circle round the pit. Each valve chest is also in communication with a circular pipe *C*, by means of pipes and taps *R*, and the circular pipe is connected with the pumps *P*, as also with the connections *A*, by pipes and taps $R_1$ and swan-neck pipes *T*.



ARRANGEMENT OF APPARATUS FOR SINKING SHAFTS

The working of the apparatus is as follows: To ascertain whether fissures extend, for instance, between the opposite boreholes 1 and 6, the valve chests of each are connected to the circular pipe leading to the pumps, the tap *R* at the No. 1 hole being opened and the valve closed, while the converse is effected at No. 6 hole. The pump then forces water down the No. 1 hole, and if there is any connection between them, the water rises in the No. 6 hole. When the fissures have been located, the taps *R* are closed, and those marked $R_1$ are opened, the pumps being set going and forcing water into the troughs *E*, whence it descends over *m n* and through the valves into the boreholes. Cement is mixed with this water, and the resulting cement milk enters the boreholes at low pressure. To increase the pressure, so as to force the cement into the fissures, the tap $R_1$ and the valves are closed suddenly, and the taps *R* opened, the speed of the pumps being increased at the same time. This operation is repeated until the back pressure on the pumps indicates that the cement has closed up the fissures.

Another system has been devised by a French mine manager, M. Duvivier, for use in the case of vertical fissures. When the pit has reached the water-bearing strata and has been tubed, a bottom ring of tubing, with a number of outwardly projecting pipes, is put in, and the shaft is closed by a false bottom. The water under this latter having been pumped out, cement is poured in until the space underneath is filled, and when this cement has set, inclined boreholes are driven through the sloping pipes, each borehole being injected with thin cement until the fissures are choked up.

*Abstract of article in *Le Génie Civil*, September, 1906.

## An Improved Light for Miner

Professor Firth, at the Durham College of Science, England, recently undertook some interesting experiments with a new patent burner which has been invented by Mr. Lawson, of Marley Hill. According to the Newcastle *Chronicle*, the burner, which may be fixed to any lamp, and used with any kind of oil, was, for the purpose of the tests, fitted to the standard Marsout safety lamps, which are largely used in fiery mines. The comparison was made with the ordinary burner. After a twelve hours' test the results showed a remarkable superiority in favor of the new burner. The figures worked out from 0.65 to 0.68 for the patent as against 0.450 for the ordinary type. The oil used in the new lamp was of much inferior quality to that burned in the others.

The idea of the inventor is simple. It consists in securing a better supply of air for the top of the wick. With more perfect combustion there is a greater proportion of incandescence, and consequently a very much more increased light. And this is effected by a nick in the sides of the wick tube, which are cut at the top something like the V-shaped slits that were once so common in bell-topped funnels. In addition to this slit in the sides of the wick tube, there are at the back and front copper wire loops which further add to the supply of air at the point of burning. All this, of course, not only increases the volume and clearness of the light, as the experiments showed, but it makes the lamp much more sensitive to gas, and consequently of immense value for mining purposes. The cry in mines for years has been "more light." A miner with a good light can see more clearly what he is doing; there is a greater sense of security; and much cleaner coal is sent to the surface. The commercial value of the new burner would seem to lie largely in the cheaper oil, which its greater illuminating powers will permit being used. The device has attracted much attention among experts, and where it has been introduced into one or two mines, the verdict has been favorable. Simple as the invention looks, it has been the result of fourteen years' constant experiment on the part of Mr. Lawson.

## Coal Mining in India

According to W. H. Michael, U. S. consul general at Calcutta, the total number of coal mines in operation in 1905 was 279 (246 in Bengal), compared with 296 (256 in Bengal), in 1904. The total output of coal in 1905 was 8,417,739 tons, of which 7,234,103 tons were produced in the province of Bengal. In 1905 the production exceeded that of 1904 by 201,033 tons.

The average number of persons working in and about the mines in 1905 was 89,995, of whom 61,602 were adult males, 25,458 adult females, and 2935 children under 12 years of age.

The exports of coal to places beyond India in 1905 amounted to 873,251 tons; the best customers being Ceylon, with 381,051 tons; Straits Settlements 235,420 tons, and Hongkong 126,059 tons. The railways in India take a large share of the coal produced in the country, the consumption reaching 2,668,424 tons for the fiscal year ended March 31, 1906.

As we have previously mentioned, the shortage and poor character of the labor available for the tin mines of the Dutch East Indies has recently been a serious problem. Inquiries are now being made in Banka, as to how to improve the lot of the coolies in the mines, and to better the mining methods. It is also intended to bring the recruiting system up to the mark, especially that in use to get coolies at Singapore. According to the *Straits Times* six hundred thousand guilders will be spent next year for the benefit of the mining community in Banka.

## Colliery Notes

Statistics show that for every ton of anthracite coal mined in 1905, the companies spent 8½c. for timber.

Those who consider that the manufacture of briquets is unprofitable, and at present inopportune, should remember that the United States with all its coal resources, will import this year nearly 100,000 tons of briquets from Belgium alone.

When steam has a gage pressure of 100 lb., and a condensation of 1 per cent., it must be superheated 20 deg. to insure dry steam. In a similar manner if the steam has a 5 per cent. condensation, a superheat of 100 deg. is required to attain a similar result.

The longwall system of working is used extensively in England, due to the fact that the seams are not at a great depth, and the heavy cover crushes the pillars so badly that a large percentage of coal is lost when the room-and-pillar method is adopted.

The American Smelting and Refining Company has started a new model town near Trinidad, Colo. It has contracted for the erection of 80 houses, to cost $500,000. Every building in the town will be of concrete. The only wood to be used will be on the roofs and the inside fittings. It is the aim of the company to make the houses both permanent and sanitary.

One of the most important conconsiderations in designing the surface plant of a colliery is to locate the boiler house at a central point, so that steam will not have to be carried too great a distance to the various engines. If distances be too great, electrical transmission of power may be more economical than piping steam.

Twenty years ago washed coal in Pennsylvania was unheard of, but last year nearly three million tons of fuel for making steam was recovered by washing from the culm banks, which were mere waste a few years ago, but are now being rapidly turned into money. It is this washery coal which is competing with the bituminous product. Last year the coal recovered in this way sold for $1,818,062.

Many mining engineers have disputed the superiority of the compound engine for winding, owing to its short runs and frequent stoppages, and the large proportion of its power taken up in accelerating its load. It is possible, however, to install a four-cylinder compound engine of sufficient power to dispense with any live steam in the low-pressure cylinders, which latter condition is seemingly the cause of much of the inefficiency of some of the existing compound engines.

In certain instances the inertia due to the additional weight of the conical drum over the cylindrical form has entirely offset the advantage of its form. This is principally caused by the extra width of the cone drum required to hold the same length of rope that could be wound on a cylindrical drum. The extra width increases the weight, and also the cone form requires more support than the other style. If, however, there are only four or five revolutions on the cone part, the width is increased but little.

While drilling a well near Berkeley Springs, West Virginia, a 7-ft. vein of anthracite coal was struck at a depth of 125 ft. The coal is said to be of the same quality as the Pennsylvania anthracite, and is part of the seam between Berkeley and Morgan counties, which is now being explored with a view to development by Pittsburg capitalists. If coal is found in paying quantities, this field, being located near Washington and Baltimore, will prove of great value and importance.

Five men were killed and one was fatally injured by a hoisting accident on Nov. 3 in the mine of the New England Coal Company at San Toy, in Perry county, Ohio. Eight miners were being brought to the surface in the cage when a cable broke, causing the cage to tilt to its side. Six men fell out and plunged to the bottom of the shaft, a depth of 150 ft. One grasped the side of the cage and held on while it was drawn the remaining 100 ft. to the surface. The other man was in position to remain securely in the cage.

Successful winding drums are now built so as to combine the features of both the spiral and the cylindrical form. At one modern plant, the drum diameter increases from 16 ft. to 24 ft. in three revolutions, and the rope coils for the remaining 22 revolutions on the 24-ft. diameter. This enables the engine to get quickly into speed, and also assists in retarding the motion at the end of the wind. At this shaft the time taken to raise the total load from a depth of 1875 ft. is 45 seconds.

Steam-winding engines, as at present used in this country, are among the most inefficient appliances about a colliery, owing to the large amount of power for starting and accelerating the load; the steam consumption of these engines per horse-power hour of actual work done, in raising coal, varies from 50 to 120 lb. in many cases. The difficulty encountered in applying electricity to hoisting is due to the trouble in satisfactorily connecting motors to the existing drum. Electric hoisting is not only economical, but it is simple of control and the motors afford a uniform torque, which lessens the fly-wheel effect of the winding engine.

A coalfield which exemplifies successful longwall practice, is that located in Lafayette county, Missouri. The coal seam in this district varies in thickness from 16 to 24 in. Underlying the coal is a thin sulphur band, beneath which occurs a stratum of fire clay. Overlying the coal is a 10-in. band of block slate, and a 3-in. layer of draw slate. Next above is a 5-ft. cap rock of limestone, which forms the permanent roof. The draw slate and rock slate come down with the coal in large chunks, forming suitable blocks for use in building pack walls. Practically no timber at all is required for operating the mines in this field.

If no further deposits of anthracite coal are discovered in Pennsylvania, it is probable that the present supply will be completely mined in 80 years, allowing for a proportionate increase in tonnage based on collected data. This is not a very long time and is a menace to the continued prosperity of the region affected. It is true, however, that there is no instability in the development of the large cities throughout the hard-coal field, showing that little apprehension is felt for the future. The hope for new deposits lies not in the discovery of new unworked areas, but rather in the finding of seams at greater depths, and the profitable working of present seams that have hardly been considered commercially valuable.

The composition of the many different coals in America varies widely; some coals have a value of 11,000 B.t.u., while in other localities the value runs as high as 14,500 B.t.u. It is well, however, in this connection, not to confuse the two coals when considered in their pure state. If in one case the calorific value per pound of dry coal is 13,250 B.t.u., and in another 12,420, then (according to A. Bement) the two lots of fuel instead of being different, as it would appear, may have nothing more than a different percentage of ash content. The first sample might run 7 per cent. ash, and the second show 12 per cent., which would make it appear that each lot of coal has a calorific value of 14,250 B.t.u. This goes to prove that the pure coal is the same, the only difference being in the ash content.

Theoretically a miner working underground requires only 6½ cu.ft. of fresh air per minute for respiration, and the absorption of moisture and the dilution of carbonic acid gas. This, however, assumes that all air after having been breathed, is immediately removed without mixing with the surrounding atmosphere, a condition impossible to fulfil. Considering that the permissible vitiation of the air by the carbonic acid is six parts in 10,000, it will be found necessary to provide 66 cu.ft. of air per minute to dilute and carry away the 0.8 cu.ft. of carbonic acid produced per hour by one man. Considering the problem in this light, it is readily evident that although an average man at work breathes only about 750 cu.in. of air per minute, the amount necessary to carry away the gases given off is the important consideration. If mine operators were to conform simply to the law which requires 100 cu.ft. for each man per minute, the quality of the air in our mines would be dangerously impaired.

## Metallics

The by-products obtained by the London Gas Light and Coke Company are said to be worth $8.16 per 2240 lb. of coal treated.

On the top of the head gear a crane is useful, and saves time when a pulley has to be changed. Pulleys throughout a mine should be of uniform size, so as to be interchangeable if necessary.

A novelty in tin-ore dressing in Cornwall is the use of the Ferraris ball mill for crushing the ore. A single mill crushes 2240 lb. of ore per hour to pass a 30-mesh screen, requiring 7 horse-power.

In England the South Staffordshire Gas Company supplies gas for power and heating to an area of 163 sq. miles between Birmingham and Wolverhampton. The coal is gasified in Mond producers.

According to Arthur J. Martin, the average price paid for coal by 113 of the largest gas works in Great Britain, producing altogether two-thirds of the total gas output, is $2.71 per long ton. The average value of the coal at the mines is probably between $1.46 and $1.70.

Many mines are badly off because of poor judgment in starting the first shaft. Often a shaft is cramped in size; or else, in low ground no attention is paid to raising the collar to a suitable hight to meet the contingencies for handling or tramming the ore to a favorable mill site.

Unless a building has to be made to suit the exigencies of the shaft, it is well to lay out all houses either north and south, or east and west. This will cost nothing extra, and a mine laid out in such a manner looks more becoming to the eye than one where buildings have been dumped down indiscriminately.

The price of gas, as now generated and distributed in Great Britain, ranges from 22c. per 1000 cu.ft., as supplied for gas engines at Widnes, to upward of $1.82 per cu.ft. The average price throughout the United Kingdom is about 65c. The low price of gas at Widnes is due to careful management, efficient apparatus throughout and judicious coal buying.

E. P. Mathewson, manager of the reduction works of the Anaconda Copper Company, is of the opinion that an increase in the length of the blast furnaces employed in lead smelting, similar to the increase in the length of the copper furnaces at Anaconda, which he has made, would lead to a reduction of the percentage of coke required from 14 per cent. to 12 per cent.

When temporary arrangements are being constructed around a new shaft, it is conducive to a great saving in the future that some foresight be shown with regard to the permanent plant. The temporary gear can be fixed to one side, and eventually it becomes an easy matter to build the permanent works around the temporary, without having to suspend operations in the shaft.

Head-gear sheaves should have a diameter as nearly equal to the drum diameter as possible, and the plummer blocks of the same close to the boss to counteract any bending strain on the axles. As these bearings are out of the way and liable to neglect, it is recommended that these be of the ring self-oiling type. These bearings give no trouble, require little attention and only need oiling about once a week, proving economical and reliable.

It is only within the last years that much attention has been paid to the economies and efficiencies that may be attained in equipping and working a mining plant. There is no doubt many abandoned mines would be working today if a competent engineer had been consulted with regard to the most suitable machinery required, instead of the matter being left in the hands of a superintendent who knew absolutely nothing of engineering principles.

Moissan has found that, at its boiling point, copper dissolves graphite, and, upon cooling, the graphite is given out again in the form of more or less well defined crystals. This fact may explain the small black specks occasionally found in the fracture of brass castings. At the usual brass-melting temperature there is, undoubtedly, little absorption; but in overheated metal it may be possible that the dissolved graphite plays a more important part in weakening copper and its alloys than usually is supposed.

The large blast furnaces, 56x612 in. at the tuyeres, at Anaconda, work with 10 per cent. of coke, whereas 11 per cent. was needed for the furnaces 56x180 in. The saving arises from the fact that while the sectional area at the tuyeres has increased 3.4 times, the radiating surfaces at the sides up to the top of the charge have increased only 2.4 times. Nevertheless 6 per cent. more fuel is burned in a unit of time, thus increasing the maximum temperature and giving more satisfactory fusion.

At the Washoe Smelting Works, Anaconda, Montana, there are 56 MacDougal roasting furnaces, as improved by Evans and Klepetko. These furnaces are arranged in 14 rows, each row comprising four furnaces, and each group of four furnaces being driven from a common shaft. Any furnace can be operated independently—that is to say, stopped and started—by means of its own friction clutch. There are four groups of furnaces, each driven by a motor, which receives its current from the central power-house.

In the mortar box of the ordinary stamp mill the pulp simply splashes against the screen and does not wear it out so rapidly as are worn the screens of the Huntington mill, wherein with rollers revolving at 80 or 90 r.p.m. the pulp dashes against the screen with a series of blows, and fine wire not only wears out but bursts. With two rollers at work instead of four, the screens seem to wear out more quickly. The screens for use in a Huntington mill should consequently be of a heavier wire than the screens for other purposes.

The smelting of tantalum from the mineral and its separation from niobium, which is practically always found mixed with tantalum to a more or less extent, is a long and costly process. One method is by fusing in an iron crucible three parts of sodium fluotantalate with one part of metallic sodium, the mixture being covered with a protective layer of potassium chloride; the reaction is very violent with development of great heat, after which the mass is allowed to cool. The metal obtained in this manner is of granular form, and is freed from the sodium salts by washing with water, but this metal is not pure, having a specific gravity of only 10.75 to 12.80, whereas pure tantalum is 16.8 to 17 in specific gravity.

Previous to 1899 the supply of zinc ore smelted in the United States was obtained chiefly from Missouri, Kansas, Wisconsin, New Jersey and Virginia, with comparatively small quantities from Tennessee and Arkansas. There was no ore received from the country west of Kansas, except from a group of mines near Hanover, N. M., whence some shipments were made about 1893, and possibly some small, spasmodic shipments from other localities, of which no record has been preserved. The ore from Hanover was sent to Mineral Point, Wis., and Waukegan, Ill. The freight rate to those points was $12 per 2000 lb. Under the market conditions of that time, it being a period of general industrial depression and low prices, there was no profit in the business and the exploitation of the mines ceased.

The reverberatory smelting furnaces at Anaconda, Montana, have a layer of 3 in. of sand spread over the top of the furnace arch, which tends to prevent leakage of excess air through the joints of the brick of the arch, and also helps to conserve heat. When the sand is removed at any spot upon the arch, red-hot brick shows itself. This is a detail which might be imitated advantageously in many metallurgical furnaces. Commonly the roof arch is constructed of only one brick thickness, that is to say 9 in. Of course the loss of heat by conduction through so thin a wall, and radiation, is very large. The thickness of the wall, in other words the roof arch, can be increased by putting a layer of sand above it, this layer naturally rising and falling with the expansion and contraction of the arch, and keeping the latter always air-tight, or as nearly so as possible.

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**Illustrated*

## Mules vs. Horses in Mines

Where animals are used for haulage purposes in coal mines, it is a question as to which are preferable, horses or mules. The decision in many instances is of course influenced by the hight of the coal; mules being more generally used in low seams.

There are, however, several districts where the coal is low and haulage is accomplished by using ponies. These small animals are hardy, fast, and strong for their size. They can enter places where low roof would make it impossible for horses to work. When the coal seam is 6 or 7 ft. high, the question resolves itself into a study of the merits and practical advantages of using either mules or horses.

The mule is possessed of much endurance and is powerful, but has neither the docility nor intelligence of the horse. One fact is, however, true, viz., that where mules are vindictive and treacherous, these objectionable qualities are cultivated and encouraged by the drivers who handle them. Such action on the part of these men is done unintentionally and is the result of wrong ideas fostered by early traditions. No sooner does a trapper boy enter a mine than he is taught to believe that the mine mule is only responsive to curses and ill-treatment. Is it any wonder then that these animals are suspicious and difficult to manage? In a number of instances, drivers have become so incensed at the action of their mule as to kill the animal with a piece of iron or club that lay handy. Many mules are intractable and can never be used to advantage in underground work; however, it is likewise true that a great many good mules have been ruined for mine work, by merciless and brutal treatment. To prove these statements it is only necessary to go to the mine stable and look at the mules on the hospital list and trace the true cause of their injuries. It would be unfair to condemn as a whole the treatment of mine mules, for many foremen, miners and drivers have big hearts and treat their dumb friends with much kindness.

Many occurrences have gone to prove that mules have more intelligence than is generally credited to them. One West Virginia miner today bears a lurid scar on his cheek as a forceful reminder of a mule's memory. A new supply of mules was brought to a large bituminous mine. These animals had never worked underground before, and one driver seemed to think it necessary to beat his mule into submission. His efforts extending over two days were rewarded with no success and another driver was asked to work this animal which was said to be unusually mean. This driver, by using kindness, soon developed the mule into one of the best workers in the mine. Almost a year later this last driver was one day appointed to help the surveyors and another man was sent to drive his mule. The animal was standing in the entry and refused to budge; the driver cursed and struck the mule with the result that he got too dangerously near, and one of the mule's hoofs came in contact with the side of his face. The driver was the same one who had first failed to work the mule and the animal had never forgotten.

In a Pennsylvania mine one afternoon at quitting time, a mule was standing in a main cross entry and refused to allow anyone to pass. A number of miners on their way from work were congregated in the entry; the foremost ones were shouting at the animal, whose business end was in their direction, but they did not venture any nearer than enough to try and drive him on by throwing lumps of coal. The mule's ears were laid flat on his head and both heels would fly back warningly when anyone approached. The driver, a youngster about 12 years old, who had gone into an adjacent room, noticing the lights and the unusual excitement came running up, broke through the crowd and throwing his arms around the mule's hind legs, burst forth with a derisive laugh, then with a "get up Peter," mule and boy went rattling down the entry to the astonishment of the sheepish-looking miners.

Mules are not as liable to diseased hoofs as horses, but on the other hand, horses can pull more and are more intelligent. It is also true that drivers have more faith in horses and consequently do not treat them as roughly. In most parts of Ohio and Maryland, horses are used exclusively, while in West Virginia and Pennsylvania, it is the common practice to use mules. The horse for general purposes has been found more satisfactory, especially where the roof is high and the stables on the surface. It is cruel to keep animals underground month after month, and modern methods, in shaft mines at present, are tending more and more to the

practice of hoisting the animals out of the mine each evening, which action is not only more humane, but does away with the problems of ventilating and providing sanitary measures for an underground stable.

The day for dispensing with animal haulage in favor of mechanical locomotives underground is drawing near; and so far as figures and collected statistics are concerned, it is impossible to find where the use of either mules or horses in underground work is economical. If, however, we still deem it best to use animals in some mines, let us insist on having drivers treat these dumb friends with kindness and a fair amount of consideration.

## The Increase in Wages

The leading feature of the past week has been the increase in wages announced in several important mining districts. The miners employed at Bisbee and Tombstone, Arizona, received an increase of 25c. per day, to date from Nov. 1, while the miners of Butte received a similar increase to date from Nov. 15. Incidentally it may be remarked that Bisbee is distinctly a non-union camp. At all of these camps, miners now receive $3.75 per shift of eight hours. The wages of the men working in the smelters of the Amalgamated company at Anaconda and Great Falls were also raised. The Standard Oil Company fell into line by increasing the wages of the men at its refineries throughout the country.

These increases followed similar action by certain of the large railway systems, and it is probable that a similar move will be made by other large industrial companies, both the United States Steel Corporation and the American Smelting and Refining Company having been mentioned as having the matter under consideration.

This action on the part of these great employers is undoubtedly due to the shortage of labor of which many industries have been complaining for many months. It is well known, for example, that the copper production of the three great districts of the United States, namely, Montana, Arizona and Michigan, will show but little, if any, increase in 1906, for the sole reason that it has been impossible to secure men enough to operate the mines and smelters to their maximum capacity. In other lines of industries there is also a shortage of labor. In few, or none, is there any over-supply.

The increase in wages which is now being made is, consequently, to be regarded as a new bid for labor, and is especially important in indicating to the laboring men that what they have to market, the work of their hands and brains, is governed by the same law of supply and demand that regulates the price of everything else bought and sold. This object lesson ought to do much toward dissipating the feeling on the part of a large body of the laboring men that their incomes are arbitrarily dictated by the great corporations and other large employers. And it ought to reconcile them to any reductions that adverse conditions may necessitate in the future; we hope it will be in the very distant future.

The present increase in wages is based on sound economic conditions. After all, the most important and most gratifying feature in this new development is the plain manifestation that the general condition of business in the United States is so prosperous that a betterment of wages is not only necessary, but also is possible.

## The Mining Stock Speculation

The speculation in mining stocks, especially on the New York curb market, is attaining astonishing proportions. It is trite to say that some day many bubbles will burst and thousands of investors will find that their money has been transferred to the pockets of other persons. Words of warning are futile in the face of such a rampant success as Nipissing, which in its spectacular rise has in a few months made millionaires of half a dozen and comfortable stakes for many. On looking down the long list of stocks quoted on the curb there are doubtless holders of each and every one who has fond hopes that it, too, may sextuple in value before many months will pass. Who can tell where the lightning will strike?

We shall not preach on this subject, knowing the futility of any sermon we might be able to offer. We shall merely remark that the large sales reported are in many cases "wash sales" made for a purpose, it being well known that the banks will not lend on these stocks, wherefore transactions on margin are not easy to make, and it being inconceivable that so much outside cash is legitimately changing hands as would appear from the totals. We may also remark that the modern method of unloading a mining enterprise on the public is through the medium of the stock exchanges, a method which London has adopted as well as New York and Boston.

This leads us to refer to the enterprises which are offered through the medium of newspaper advertising. Of late the number of full-page advertisements appearing in the New York dailies has increased to an extent which indicates that there is plenty of business doing in that direction. We do not discriminate between these and some that are offered on the curb, except to say that information as to the latter may possibly be more easily available. The general tenor of the newspaper offerings is: "If you don't hurry up and buy this stock, you won't be able to get any." Information of practical value as to the mine, etc., is usually conspicuous by its absence. To those who feel an inclination to buy that kind of stock we beg to suggest that there are many reputable mining engineers resident in the districts, whose names and addresses can easily be obtained, who would be willing for a $10 fee to respond to requests for information regarding these properties that it would be worth the while of intending investors to secure.

THE VARIETY of nationalities which is to be found in the mining region of Lake Superior is shown by the report of the mine inspector for Marquette county, Mich., for the last year. Sixteen accidents were reported during that time, and the men who suffered from them were of seven different nationalities. The Finns led with 11; two were Italians, Swedish, English and French Canadians respectively, while one Pole and one Irishman were included in the list. It will be seen that not one was of American birth.

LAKE IRON-ORE shipments for the season up to Nov. 1 reached a total of 33,238,835 tons, a gain of 3,508,220 tons, or 11.8 per cent., over the corresponding period last year. Nearly all of this great increase—3,193,426 tons—came from the Mesabi and Vermillion ranges.

SILVER PURCHASES for the United States mint have been suspended for the present. This is partly because the Secretary of the Treasury considers present prices too high; and partly because the mint has a sufficient supply for subsidiary coinage to carry it to the end of the year.

## The Depreciation of Plants

BY R. W. RAYMOND

E. P. Mathewson's letter in the JOURNAL of Nov. 10, on the depreciation of copper-smelting plants, and the editorial of the same date, on the question of smelting plants in general, deal with a question of immediate and portentous interest to the stockholders in modern enterprises of this kind, and especially in the great concerns popularly known as "trusts." For the principal danger of such large aggregations of capital affects not the public, or "society," or "liberty," or "humanity," or any other sentimentally generalized personification, but the participants in such enterprises themselves. The history of all railway and "industrial" undertakings is, that they require periodically fresh capital for the renewal of their plant. And the predominant element in such necessary renewal has not been the repairs required to keep the old plant in serviceable condition, but fresh investments needed to bring the plant up to the requirements of technical progress. Our railroads have been forced to lay heavier rails and provide heavier engines and cars; the owners of our iron blast furnaces have been forced to rebuild them on a larger scale, and with expensive auxiliary appliances, or shut them down in hopeless idleness. Even the copper plants, to which Mr. Mathewson specially refers, have been so transformed within the last 20 years as to make his assumption that existing plants of this class will last 20 years a highly questionable proposition.

Mr. Carnegie's reference to "depreciation," due to the advance of the art, was not original with him. This form of the destruction of fixed capital through the supersedure of apparatus, etc., not yet actually worn out, was discussed long ago by David Wells, who estimated that during the 25 years preceding 1890, at least 50 per cent. of the capital of the world thus invested had been thus destroyed. The process has been rather accelerated than retarded since that date; and I think it would be safe to say that 50 per cent of the world's capital has been again wiped out by the abandonment of inferior methods and apparatus, still in working order, but no longer profitable. But this general estimate does not tell the whole story; for the loss has not been equally distributed among all investments. On the contrary, it has fallen with special weight upon metallurgical plants and processes. The abandoned blast furnaces and other smelting works throughout this country furnish a convincing proof of this proposition.

Andrew Carnegie is distinguished for the courage and promptness with which, when in active business, he discarded inferior apparatus, whatever might be its condition. I have known him to tear down new buildings and appliances, which had cost several hundred thousand dollars, in order to install something better, while his business competitors were saying to themselves and to their engineers: "That seems to be a good thing; *when we rebuild*, we may have to adopt it!" No small part of Mr Carnegie's fortune was thus gained.

It is, perhaps, not necessary that a private firm should provide in its bookkeeping for such necessary sacrifices and expenditures by setting aside a fund for the purpose. But it *is* necessary that a corporation should do so. Private owners can put their hands in their pockets, and supply out of former profits the fresh capital required; but corporations cannot easily recover past dividends for such purposes. They must issue new stock or bonds to obtain the necessary money; and it is not easy to convince a board of directors, with clamorous stockholders behind it, that such measures are advisable. This is the greatest weakness of large corporations—that many men must be made to agree upon important expenditures and sacrifices. On the other hand, if an adequate fund has been set aside for such purposes, there is usually little objection from directors or stockholders to expenditures made from that fund for technical reasons. It is, therefore, in my judgment, best for the interest of every such corporation, as well as for the credit and success of its technical directors, to make the allowance for repairs and renewals as large as practicable.

Apart from the sweeping changes which have been chiefly considered above, I must say, as the result of 40 years' practice and observation, that even ordinary "maintenance" and "repairs" are not, as a rule, confined to the restoration of former conditions. I never knew of serious "repairs" in a metallurgical plant that did not involve also improvements. The manager always seizes such an opportunity to make the plant or furnace in some respect better than it was before; and the simple cost of restoring it to its exact former condition does not by any means, cover the expense of the operation.

To these suggestions, Mr. Mathewson might fairly reply that the item of depreciation should not be made to carry all these outlays; that the cost of current repairs (including all improvements not revolutionary, and not amounting to new constructions) should be charged to current expense; and that the fund for new constructions should be a separate thing. That statement is, to a certain degree, correct. Yet, considering the matter as one of book-keeping only, I think the fund for reconstruction should appear in the balance-sheet as an asset on capital account, and not wholly as an undistributed surplus In other words it might well be offset, to some extent, by the item of "depreciation," the value of the plant being reported, not solely on the basis of the time it might still last, with ordinary current repairs, but also in view of the consideration that it will probably have to be largely replaced, as well as repaired, before the end of that period.

The estimate that a given metallurgical plant will last 20 years before wearing out entirely is, after all, a purely academic proposition, in view of the fact that it will, in all probability, outlive its usefulness long before it has completed that normal term of life. No matter how we keep the books, this is the overwhelming fact that stares us in the face.

## Antimony in China

There is in China an antimony industry of considerable magnitude. According to B. Giles, acting British consul at Changsha, a considerable portion of the antimony ore exported from that place goes to the firm of Carlowitz & Co., which has smelting works at Wuchang. A large quantity of ore is also exported direct to foreign countries, especially to the United Kingdom. There are two antimony-smelting establishments at Changsha. The carrying of the antimony is chiefly in the hands of the junks, and the customs figures show only a small percentage of the total export. For the year ended Dec. 31, 1905, the latter is said to have been 37,611 cwt. of regulus, and 39,740 cwt. of ore.

## Chlorophosphate of Lead in Algeria

According to a recent British consular report, the Ain-Smara mines, situated 11 miles from Constantine, contain rich lodes of chlorophosphate of lead. The lode becomes wider as it descends, increasing from 9 ft. on the surface to 18 ft. at the bottom. Other beds of carbonate of lead have recently been discovered near Batna, but so far have not been worked for want of capital.

## Erratum

In the article on "Zinc Concentration in Australia," by Edward Walker, in the JOURNAL of November 3, there was a typographical error, which must of course have been perfectly obvious, although a reader could hardly guess what the correct figure might be. It was stated that the mixed blende-galena concentrate produced by the Potter process was further treated by mechanical separation, producing a zinc concentrate containing 50 per cent. zinc, 43 per cent. lead and 8 oz. silver per ton, in which statement the correct figure is 4.3 per cent. lead, the decimal point having been omitted by the compositor.

# A Switchboard Attachment for Electrolysis

BY E. L. LARISON.*

The electrolytic method for the determination of copper in furnace products and most ores is deserving of considerable attention in technical laboratories. It is the most accurate of the technical methods and can be made about as rapid as the majority of the other methods.

In order to obtain the best results in electrolysis the main mechanical points to be considered are: (1) Source of current. (2) Suitable arrangement for determining current and voltage at will. (3) Close control of the current in the individual solutions. The arrangement described below, which was built entirely at the laboratory, has given excellent satisfaction.

The source of current is a 3-cell storage battery charged periodically from a 125-volt direct-current lighting circuit. Where such a lighting or power line is available, a storage battery is by far the most satisfactory source for supplying current to the electrodes. It is almost as independent as primary cells, and does not require the attention that the best of primary cells demand. It is necessary only to keep the potential difference between terminals where it belongs, and occasionally to add a little water to the jars. With our three cells in series, we have, with no load, a potential difference between terminals of about six volts. To reduce the 125-volt pressure of the charging line, a bank of twenty 16-c. p. lamps in parallel is placed in series with the battery. Calculation of the necessary resistance to produce the charging current desired is a simple application of Ohm's law—

$$\frac{\text{Drop}}{\text{Amperes}} = \frac{125-6}{10} = 11.9 \text{ ohms.}$$

$$\frac{\text{R. one lamp}}{\text{R. required}} = \frac{250}{11.9} = 20 \text{ number lamps.}$$

The main switchboard wiring is shown in Fig. 1. The voltmeter reads to 15 volts, divisions 0.2 volt. The ammeter reads to five amperes, divisions 0.1 ampere.

It will be noted that two separate circuits in parallel are provided, each including a number of resistances in series, consisting of german-silver wire coils.

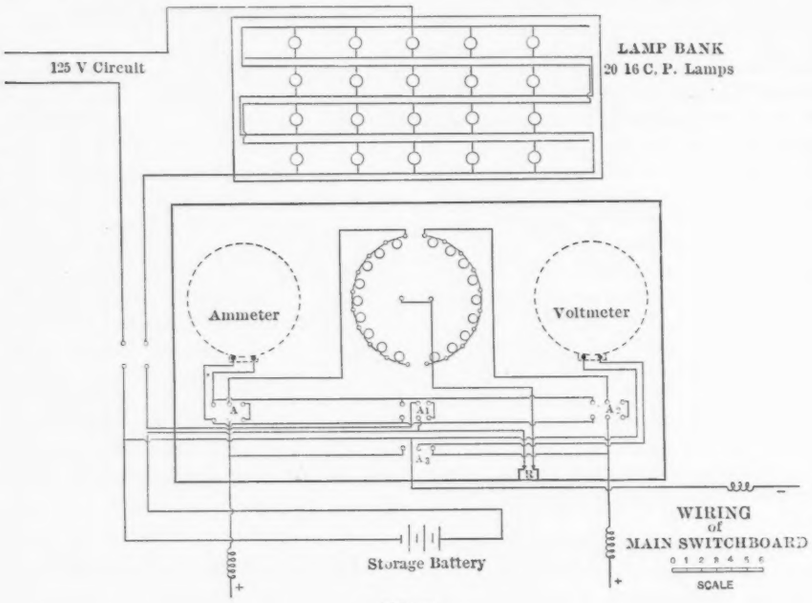



FIG. 1

Any number of these may be plugged in giving close control of current in each circuit.

Small double-throw knife switches $A$ $A_1$ $A_2$ allow current in each circuit as well as in the charging line, to be noted at will. Switch $A_2$ allows voltage readings.

To obtain a close control of the current supplied to the individual solutions undergoing electrolysis, a second or auxiliary switchboard has been installed. The wiring is shown in Fig. 2.

The negative from the main board is permanently connected with one of the poles of each of the single-throw switches $S\,S\,S$, etc. The positives, of which there are two, each including one of the variable resistances on the main board, may be plugged in at any of the points marked $P$. The $P$s may also be plugged together. As shown, 2, 3, 4 and 7 are in parallel on one circuit and 5 and 6 in series on the other. A great variety of combinations can be made, giving almost any desired current and voltage, within the limits of the battery, to any particular solution.

Those who have been working with samples whose compositions vary widely know how the current favors the solutions which have low resistances to the almost complete exclusion of the higher ones, where all are in multiple. By plugging similar solutions together, or unlike ones in series, the current can be forced through all. This auxiliary board is much more satisfactory than the usual arrangement—which was formerly used here—of electrodes all in multiple along a pair of copper bars.

The auxiliary board is made in two parts back to back, the switches and plugging holes on one side, and the electrode posts on the other. The jars on their blocks rest lower than the bottom of the board, so that the effects can be noted as the switches and plugs are manipulated from the opposite side.

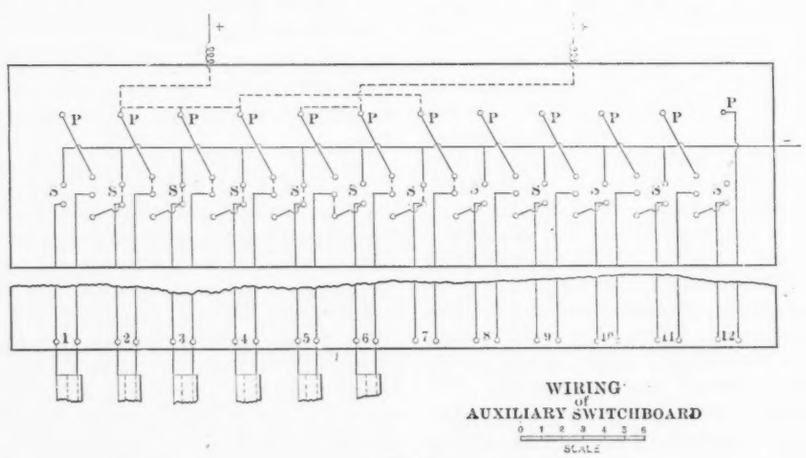



FIG. 2

The lease of the Quartz Hill mine at Old Diggings, Shasta county, California, to the Mammoth Copper Company is a good instance of the benefit of a copper smelter in the vicinity of gold mines. The Quartz Hill mine has very large bodies of silicious ore carrying gold, but the amount is too small to pay by mill process. It is a type of numerous other mines in that county. The smelting company needs the ore for flux and agrees to take out not less than 50 tons daily during the term of the lease. The gold is a by-product that goes almost free to the mine owners.

*Chemist, Ducktown Sulphur, Iron and Copper Company, Isabella, Tenn.

# GOLD WASHING IN THE SOUTH

## Crude Methods Succeed Where Expensive Outfits Would Fail

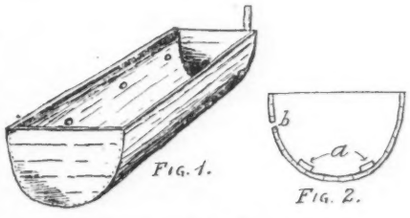
BY E. B. WILSON*

Placer mining in the Southern States dates back to the earliest period of this country. The weathered Cambrian rocks of Georgia, South Carolina, North Carolina, Virginia and Maryland have been washed for gold off and on and have been the means of evolving the cradle or rocker, the hydraulic elevator, and, I believe, the first gold dredge in the United States, which the Marion Steam Shovel Company constructed.

The rocker is still in use, and those natives who have the gold fever consider it the best apparatus for washing dirt in existence. Although it is a crude affair, Fig. 1, it is nevertheless effective in the hands of one accustomed to its manipulation. The Southern placer gold is fine, most of it being mere colors, so that pieces from the size of mustard seed up are called nuggets.

Men cannot pan sufficient quantities of this dirt to make wages, but with a rocker can wash from 2 to 2½ cu.yd. daily. The rocker has two longitudinal riffles *a* placed about as in Fig. 2, which is a cross-section. The riffles are about the thickness and width of bed slats, the object being to retain the black sands and gold between the two. The dirt to be washed is shoveled into the tub until the bottom is covered. Water is next poured in and the apparatus rocked to clean the mud from the larger pieces of stone. The cradle is then tilted until the dirty water will run out of plug holes *b*, after which the larger pieces of rock are raked out over the side. This operation is repeated until the water poured in and agitated remains comparatively clear and there are but few small stones in the tub. Expert work now begins, the object being to wash the light sands over one riffle and leave the gold and heavy black sands between the two riffles. To accomplish this a quick jerk is given the rocker one way and then as the water moves to one side it is allowed to come to rest slowly and flow back. The motion is similar to that given a pan when a pencil of black sand is being formed, except that the hight of the wave movement is decreased gradually on one side of the tub and increased on the other until all the light sands are on the long-wave side. When this is accomplished the heavy sands are between the riffles, and the gold is picked out. Expert manipulators of these cradles claim that they can save 90 per cent. of the gold. They do not use mercury either in the cradle or in the clean-up, from the fact that it costs money, becomes foul quickly, needs retorting, and must be cleaned before it will amalgamate properly, all of which means extra labor and expense, which they cannot stand, with such small operations.

Combination rockers, such as were used at Gold Hill, N. C., are made by connecting several single rockers by rods, the pulp being conveyed to them by a trough. The riffles in these rockers are crosswise of the trough and only one end is closed, making it virtually a rocking sluice box. A woman often furnished the motive power, shifting her weight alternately from one side of one rocker to the other. In many instances these rockers were used as concentrators in conjunction with Chilean mills.




NORTH CAROLINA TROUGH WASHER

Many placers in the South carry values that range from 50c. to $1.50 per cu.yd., and when this is compared with the low values of placers in the West the inference is that the people in the South are slow. In Idaho, one placer carrying but 4½c. per cu.yd. is worked profitably, and in California a placer carrying 50c. per yd. is a bonanza; the formations, however, are entirely different, so that California practice is not at all profitable in the South.

Most Western placers have been formed by the dynamic action of water. The ancient and recent river gold deposits so formed carry rounded gravel, stones, and sand with little clay. The Southern deposits are the result of the chemical disintegration of rocks, consequently the gold is found in very fine particles in a sticky red clay, that is difficult to break up and carry away in water without carrying the gold with it. The clay often carries impurities such as antimony and manganese, besides more or less talc, that coat the fine gold and assist it in floating away.

Observations and experience have convinced those who have tried hydraulicking as practised in the West that it will not do in the South. It cost considerable money to ascertain this fact, although at first sight it looked easy. The reasons why it is not feasible may be given as follows: First—There is no gravel or sand in the dirt to loosen up the clay; Second—The clay carries impurities that prevent the gold from amalgamating readily in riffles.

This latter statement is deduced from experiments by the writer, who found that coarse gold failed to amalgamate, and, when mixed with dirt, would float over the mercury.

The United States Geological Survey has established an experimental station at Chapel Hill, N. C., similar to that established last year on the Pacific coast for treating the black sands. There is no question as to the finding of values in the black sands, but only as to how the sands can be obtained and the gold recovered from them at a profit. The problem of saving the gold and much of the black sands as well has been solved to the satisfaction of several miners at least, as may be described at some future time.

*Mining engineer, 1004 Delaware street, Scranton, Penn.

## The Kjellin Electric Steel Furnace*

BY E. C. IBBOTSON†

At Gysinge, in Sweden, during the year ending May 31, 1906, from a fixed furnace giving 2240 lb. of steel per tap, there were produced 950 long tons of tool steel and special steel ingots. The bulk of this was made from charges composed of about 80 per cent. of Swedish white pig iron and 20 per cent. of steel scrap. The percentage of carbon was regulated by the addition of briquets.

The average time taken per charge, when adding briquets, was 7⅛ hours, and the electric energy consumed was 1128 kw.-hours per ton. The average time per charge for white iron and scrap charges was 5½ hours, and the electric energy consumed was 886 kw.-hours per ton. These consumptions include all time and energy lost from various causes. It is the ordinary practice to complete the charges with briquets in 6½ hours, and without briquets in 5 hours.

The lining of the furnace was magnesite. When using briquets the lining lasts, on an average, five weeks, and when charges are worked without briquets the average is seven weeks.

During the year satisfactory results obtained in works practice were reported, particularly in connection with the following steels: Stamping dies, punches, cold chisels, screwing dies and taps, cutlery, drills and turning tools. The following special steels have also been produced: Tungsten steel (including permanent magnet steel), chromium steel, nickel steel, nickel-chromium steel, self-hardening steel and high-speed tool steel.

*Notes from a paper read at a recent meeting of the Iron and Steel Institute.

†Sheffield, England.

## Abstracts of Official Reports

THE BROKEN HILL PROPRIETARY COMPANY

This report covers the company's operations for the half-year ending May 31, 1906, and states that notwithstanding an appreciable reduction in the output of the mine caused by the fire in the workings, the profit over the previous six months shows a very substantial increase. This was due to the higher prices of silver and lead. The gross profit for the half-year amounted to £253,474, which, after deducting various sums for depreciation on plant, cost of new metallurgical experiments, etc., leaves a net profit of £232,323. During the half-year the directors disbursed two dividends amounting to £192,000, and expended £20,691 on improvements in the zinc, pottery and other plants, in addition to adding £25,000 to the reserve fund.

The quantity of ore mined was 229,247 tons, composed of 225,278 tons of sulphide ore, and 3,969 tons of oxidized ore. The grade of ore was ¾ per cent. lower in lead than in the previous half-year. In the lower workings now being worked, the ore is of higher grade, both in lead and silver.

The mills treated 230,280 tons, comprising 221,599 tons of crude ore, and 8681 tons of tailings, as compared with 300,955 tons in the previous six months.

The re-treatment plant, which separates old tailings lead into concentrates, slimes for sintering, and material for zinc separation has proved so successful that it has been duplicated, and is now able to treat 3000 tons weekly. The tonnage of tailing treated in this plant amounted to 113,377 tons, yielding 28,276 tons of zinc concentrate. During the period reviewed, the old system of running the ore trucks between the shaft and mill by hand was abandoned, and a system of endless-rope haulage adopted with most satisfactory results, and a great saving in costs.

The large reserve of slime at the mine has been re-treated, and at present only fresh slime from the mills and re-treatment plant are treated in the sintering plant. The total quantity dealt with in the sintering works was 33,165 tons, as compared with 44,024 in the previous period.

The acid plant produced 1092 tons of strong acid, as compared with 738 tons previously. A sulphur burner was added to this plant, as the great heat during the summer months was found to disable a large number of the men employed at the roasting furnaces.

At the Port Pirie smelters, in South Australia, only five furnaces were in commission, owing to the fire at the mine cutting off supplies for a time. The ore smelted amounted to 99,364 tons, comprising 5509 tons of silicious ore; 50,256 tons of sulphide concentrate, and 43,581 tons of sintered slime. The returns were: 2664 tons of lead, 224,026 oz. of silver and 1167 oz. of gold.

The refinery dealt with 27,881 tons of bullion, producing 1,999,613 oz. of silver, 1130 oz. of gold, 27,150 tons of soft lead and 254 tons of antimonial lead.

A spelter plant is in course of erection at Port Pirie, which consists of a furnace holding 120 retorts, with a capacity of 10 tons per week. The furnace will be heated by producer gas. It is only a unit of a plant designed to produce 100 tons of spelter weekly, and if on trial it works satisfactorily the remaining units will be constructed as rapidly as possible. In view of the fact that Australia is destined to take an important part in supplying the world's demand for zinc, owing to her enormous resources of zinc ore, the directors have under consideration a plan for working in conjunction with other Broken Hill mining companies in regulating the distribution of their zinc product.

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THE BROKEN HILL SOUTH SILVER MINING COMPANY

This report is for the half-year ended June 30, 1906, and states that during that period two dividends were distributed among shareholders, absorbing £60,000, and £71,015 were carried forward.

The ore mined amounted to 95,724 tons assaying 15.8 per cent. lead, 5.3 oz. silver, and 10.6 per cent. zinc, and the average amount of crude ore treated in the mill weekly was 3673 tons. The ore was mined partly by contract and partly by men working on wages, the relative proportion being as follows: Contract, 82.2 per cent.; wages, 4.8 per cent. The average earnings of the men on contract was 11s. 3d. per eight-hour shift.

The main shaft is working to the 970-ft. level and will shortly be sunk to the 1120-ft. level. No. 4 shaft is 385 ft. in depth, and the vein in a crosscut from the 250-ft. level assays 28 per cent. lead, 17.7 per cent. zinc, and 4.8 oz. silver per ton. The estimated ore reserves above the 825 levels is 1,750,000 tons, and when the 970-ft. levels are opened up the reserves will very largely be augmented.

Experimental work on the finer crushing of mill tailing and subsequent concentration is being vigorously prosecuted. A Wheeler grinding pan was installed and a comparison made with this method of recrushing and ball and tube mills. It was clearly demonstrated that better liberation of the lead and zinc is obtained with the grinding pan, and consequently, increased recoveries of those metals can be effected by subsequent concentration. More of the pans will be added to the mill as a result of the tests, and the new concentrating plant in course of erection, which will have a weekly capacity of 6000 tons, will be furnished with grinding pans.

The results obtained by the old mill during the period reviewed were as follows: Hancock jig concentrate formed 13.2 per cent. of total product, and assayed 57 per cent. lead, 40.6 oz. silver and 8.5 per cent. zinc; May jig concentrate, 2 per cent. of product, assay value 7.3 per cent. lead, 5.8 oz. silver and 1.7 per cent. zinc; Wilfley concentrate, 1.8 per cent. of product, 7.5 per cent. lead, 5.93 oz. silver and 7.1 per cent. zinc; Luhrig vanner concentrate, 0.6 per cent. of product, assaying 2.2 per cent. lead, 1.8 oz. silver and 0.5 per cent. zinc. In addition jig tails formed 66.8 per cent. of the product, assaying 20.4 per cent. lead, 36.3 oz. silver, and 71.4 per cent. zinc; Wilfley tails formed 8.8 per cent. of product, valued at 2.1 per cent. lead, 4.1 oz. silver and 9.2 per cent. zinc; and slime-table tails formed 6.8 per cent. of product, and assayed 3.4 per cent. lead, 5.5 oz. silver and 7.6 per cent. zinc.

The costs per ton of crude ore raised were 12s. 1.1d. for mining, and 2s. 1.9d. for development work, making a total of 14s. 3d. per ton. The cost of filling the depleted stopes, which was included in the above figures, was 1s. 9d. per ton. Concentrating-mill costs amounted to 4s. 4.6d. per ton, and the total mine costs per ton of crude ore were 18s. 7.6d. and £5 6s. 3d. per ton of concentrates. These figures are higher than those in the previous half-year owing to the larger amount of development work carried out, the increased amount of lumber employed in mining operations, and the larger amount of filling in of old stopes that had to be undertaken.

The directors entered into a contract to sell the tailing dumps to the Zinc Corporation, which will commence to take delivery on March, 1907. The corporation is erecting an extensive zinc plant at Broken Hill. A contract for the whole of the concentrates produced in 1907 was signed with another large metallurgical company.

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California has now the largest area of forest reserves of any State—18,877,110 acres, Colorado coming next with 12,698,825 acres. The location and area of the California forest reserves are as follows: Tahoe, 838,837 acres; Stanislaus, 627,780; Sierra, 5,040,520; Santa Barbara, 1,838,323; San Bernardino 737,120; San Gabriel, 555,520; San Jacinto, 668,160; Trabucco Cañon, 109,920; Warner Mountains, 306,518; Modoc, 288,218; Plumas, 579,520; Trinity, 1,243,042; Klamath, 1,896,313; Lassen Peak, 897,115; Diamond Mountain, 626,724; Shasta, 1,377,126; Yuba, 524,287; Monterey, 335,195; San Luis Obispo, 363,350; Pinnacles, 14,108; total, 18,877,110 acres.

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It is reported that a 285-mile pipe line, for carrying oil, is to be built from Pine Grove, W. Va., to Marcus Hook, Penn., by the Pure Oil Company. The line will be laid with 6-in. pipe, and its estimated cost is $1,000,000. Marcus Hook lies about 17 miles southwest of Philadelphia.

# CORRESPONDENCE

## Discussions by Our Readers of Various Topics of Interest

### Economy in Mine Timbering

In determining economy in mine timbering, a system should be considered which may not in itself represent the least expenditure of money with respect to the amount of ore extracted, but which should represent the least cost possible with respect to the total cost of extraction. In other words, one system of timbering may cost the least, as far as actual expenditure is concerned, but may make the total cost of ore extraction greater on account of poorer facilities for working the orebody.

I believe it safe to assert that in metal mining as practised throughout the West, at least one-third is added to the necessary cost of ore extraction by lack of proper regard to systematic mine timbering. This is a rather bold assertion, and one that should not be made without being able to justify it by facts. It is not applicable to many mines where systematic timbering is carried on by methods which leave little to be desired. But such mines are in the minority, and I believe the following remarks are more than justified by conditions as they actually exist. stated mathematically, if we let $x$ equal the cost of timbering per ton of ore extracted, and $y$ equal the cost of breaking the ore, then that condition of affairs should exist which will render the quantity $x + y$ a minimum. The machine man is, as a rule, the highest-priced laborer underground, and the stope should be so arranged that the greater part of his shift can be spent in actual drilling rather than, as is often the case, in setting up and tearing down. I have worked in stopes where, through poor management with regard to timbering, it was usually impossible to get set up and started to drill much sooner than the noon hour, thus leaving only about three hours for actual drilling. Such conditions are absolutely unwarranted, and it seems strange that they are allowed to exist by certain mine managements.

With regard to the quality and dimensions of timber, there is, as a rule, no economy in the use of small timbers, except for convenience in handling, and this is probably more than offset by having to replace timbers shot out or broken by falling rock.

A 6-in. lagging will fill 2¼ times the space of a 4-in., but will be approximately 3⅜ times as strong. This is assuming that the strength of a timber varies directly as its breadth and as the square of its diameter presented to the force which tends to break it. The cost of such timbers varies in different localities, but, as a rule, the different sizes do not increase in cost in proportion to the increase of strength. From this it is obvious that the larger lagging, up to a size difficult to handle, is in reality cheaper than smaller sticks, all things considered. In the case of stulls, the same reasoning applies, except that in this case a certain number of stulls are usually required, whether they be small or large, and the size used must depend upon the liability of breakage by shooting and falling rock, or, in comparatively rare cases, upon the nature of the ground to be supported.

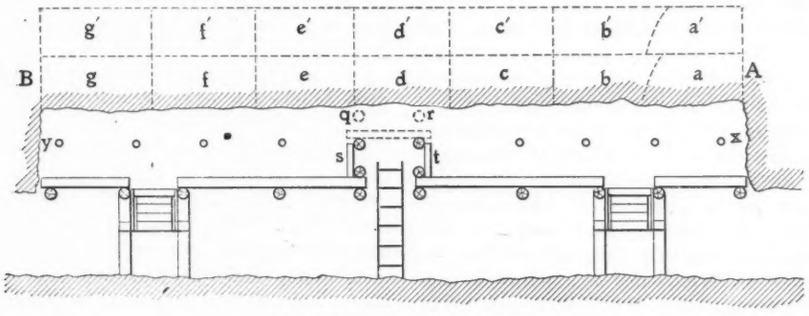


DIAGRAM OF STOPING SYSTEM

Let us consider first a method of timbering applicable to comparatively narrow stopes, say up to 8 ft. in width, which will include a majority of stopes in Western mining. I will take, for example, a typical case where the ore shoot is approximately vertical, and from 60 to 70 ft. in length. Under different conditions the method will vary only in detail, and may be readily modified to suit the conditions.

Referring to the diagram, let us suppose the stope to have proceeded to the points indicated by the full line, at which points the chutes are built, and the lagging above the level placed in position. Regular stoping operations are now commenced by setting up and taking out a cut at $a$, the machine being removed to the left, at the completion of the round, a sufficient distance to prevent breakage by flying rocks. The next shift drills the portion $b$, and at the completion of the round the machine is left under $c$. As the round at $b$ breaks toward $a$ there is little or no danger of breakage. This method is continued toward the left, the machine and tools being removed after each round to the point where they are to be used on the next round. After proceeding a sufficient distance, or before the end $B$ is reached, a line of temporary spragging is placed by the timbermen, beginning at $x$.

The stoping being completed to $B$, the machine is removed to the end $A$, where spragging is already in place to begin drilling at $a'$. Stoping then proceeds toward $g'$ as before. In the meantime before $g'$ is reached a line of permanent stulls is placed in position a distance above $x$-$y$ equal to the hight broken by a machine round. These are started at the end $A$, so that immediately after drilling the round at $g'$ staging is already in place to begin drilling again at the end $A$. This method continues throughout the stope, a row of temporary spragging alternating with a row of permanent stulls.

By this method the setting up of the machine at the beginning of the shift is a matter of only a few minutes and gives the machine man nearly the entire shift for drilling.

I have represented, for convenience in illustration, a line of temporary lagging along $x$-$y$. This temporary lagging will not be used until after the second round from $A$ to $B$ has been broken. The muck left from the first round to protect the lagging will bring the machine man high enough for the second round. The practice of removing all of the muck after each blast cannot be too strongly condemned. Yet this is often done through the insatiable desire of managers for more ore, today's supply being increased at the expense of tomorrow's. To protect the man-way in the scheme as illustrated, temporary lagging is placed across the stulls from $s$ to $t$, the permanent side-lagging being omitted until after the first cut from $A$ to $B$. After this, permanent stulls are placed at $q$ and $r$ and the lagging removed to these.

An important variation of the above method, and one which becomes more important with wider stopes, is the filled-stope system. By this method the stoping proceeds as before except that, instead of

placing spragging and stulls to work upon, the broken ore is left in the stope in sufficient quantity to enable the machine man to get at his work without any timbering. With narrow stopes readily stulled it is probably less economical than the method of timbering. It has a great disadvantage in that the machine man cannot safely work over a chute from which much is being drawn. This of course may be obviated by working in alternate ends of the stope where there is more than one chute, or by working alternate shifts tramming and drilling. Either method necessitates the removal of the machine to some distance.

The Nevada square-set system of timbering is one which has found an extensive application in wide stopes, but which can seldom if ever be recommended on the score of economy except for the first set above the level.

Even this may in many cases be dispensed with by making the level only the width of an ordinary drift and expanding the stope immediately above the first timbers.

In either wide or narrow stopes the timbers immediately above the levels may in most cases be dispensed with to advantage. This is done by driving raises at the points where the chutes and man-ways are desired and expanding these raises on both sides until those from two adjacent chutes meet. The machine man in this case labors under a disadvantage until the raises meet, but this disadvantage is in most cases offset by the small amount of timber needed and the fact of having a support above the level that there is little danger of breaking out.

G. E. WOLCOTT.

Cripple Creek, Colo., Sept. 30, 1906.

## The Electric Air Drill

In your issue of Oct. 13 there appears an article by Frank Richards, of New York, entitled, "The Piston Action of The Electric Air Drill," in which I note he refers to the beneficial effect of the air which is compressed when cushioning on the backward stroke. I should like to know what the effect would be on the forward stroke if the pressure exerted by this air cushion were not available.

It appears to me that if there should be no compression on the backward stroke, the piston would have only a powerful reciprocating motion without striking a very hard blow, and that it would have a tendency to push against the rock rather than to strike it sufficiently hard to produce the desired result, as the air from the compressor is simply pumped back and forth without acting under expansion on the piston.

I also note Mr. Richards states that no valves are used; but in Fig. 2, on page 700, there are two valves shown, these being marked, "Pull Back Valve" and "Back Head Valve. There is also shown a "Regulating Screw," but no reference is made to these parts in Mr. Richard's description. I should like to know if these parts are used and what they are for.

JOHN L. WAGNER.

583 S. Clinton St., Syracuse, N.Y.

In reply to Mr. Wagner's letter I cannot say that I understand quite clearly all that he wishes to ask as to the piston action of the electric air drill. It is to be remembered that my attempted explanation is entirely after the fact. The drill certainly does strike the fierce blow as stated. If my explanation is weak the drill is not.

When the drill piston makes its backward stroke it does not strike the back head, but is cushioned by the air caught in the end of the cylinder. The re-expansion of the air gives the piston a lively start forward and the crank-driven, and consequently accelerated, movement of the compressing piston not only maintains the pressure against the drill piston, but also, up to a certain point, increases that pressure, and the drill piston movement is consequently more rapidly accelerated and its ultimate speed and force is greater that if it had not the cushion start and then was only followed up by the diminishing pressure of a uniform air supply from which it was retreating.

If the drill is too far from the rock, so that the bit does not strike, the piston is cushioned at the front end just as it is at the back, and it will play back and forth between the cushionings as Mr. Wagner suggests, this not hitting the heads being an important feature in drill maintenance; but if the drill is fed forward so that the bit encounters the rock at the precise time when the piston speed is greatest the force of the blow is then highly effective, and as the piston is stopped by the rock it does not require to be stopped by the cushion, and the delay caused by the blow gives the compressor time to have its return pressure effective. The feeding of the drill forward to have the blow most effective requires more precision than with the old air or steam drill, but the runner soon acquires the knack of it.

In stating in my description that the drill has no valve, there was no intention to mislead. Those who know what the valve is, its operating devices, and its intricate and minute passages in the ordinary drill, also what is its responsibility, its liability to derangement, and its cost of maintenance, will appreciate its banishment. The little valves and adjustments shown in the cut of the drill have to do with the making up of leakage and the adjusting of the relative working pressures in the two ends of the drill. These parts are not costly, and they are not liable to wear or breakage. In describing a steam engine we do not usually mention the pet cocks, and in a brief general sketch of the action of the electric air drill it was better to leave these little things out. FRANK RICHARDS.

New York City, Nov. 5, 1906.

## Landlords' Dues in Cornwall

The great grievance that miners have against the owners of the land in Cornwall, England, is that the landlords' royalties are paid on the gross output and not on the profits realized. Dolcoath used to have to pay to its "lord" a sum of money equivalent to one-fifteenth of the value of its output, and it was considered a wonderful act of generosity on the part of the lord, when three years ago he consented to receive only one-thirtieth for a time. South Crofty, which was reported lately as having been turned into a limited company, pays one-twentieth, and the directors considered the bargain to be good, as such bargains go. The most reasonable terms which I have so far heard of are in connection with Wheal Kitty & Penhalls, Ltd., a new company operating an old mine at St. Agnes, and under the management of J. H. Collins. While the capital is being paid up, the landlord is to take only one-sixtieth of the gross output; when the mine is just paying its way he will get one-fortieth; and when profits are made he will take one-twentieth of the gross output. I hope some day that the Cornish landlords will agree to receiving a small fixed rent, whatever the output or profit, together with a small proportion of the profit when such is made. In the meantime any such sliding scale as that instanced at Wheal Kitty will be welcomed by mining men and financiers alike. W. E.

London, Eng., Oct. 15, 1906.

[Mining royalties in the United States are commonly based on the gross output. We see nothing unjust in that principle. The percentage that ought to be asked and paid is of course dependent upon the conditions in each case.—ED.]

## Petroleum at Los Angeles

Los Angeles, the center of one of the largest oil-producing districts of California, is confronted with the proposition that it either must secure tankage and store oil, or it must expect to pay a largely increased price for this material later on. The city is at present paying 55 to 60c. per barrel for oil used in sprinkling the streets. In asking for bids for 30,000 barrels to be delivered from April to July next year, the oil producers raised prices materially. One company offered to furnish the required quantity of oil, of not less than 55 per cent. asphalt, for 90c., and 5000 barrels, of not less than 70 per cent. asphalt, for $1.05. The city authorities now think of securing storage and buying oil at the prevailing rate, to avoid the high rate asked for future deliveries.

## New Publications

"Probenahme und Untersuchung von Koks, Kohlen und Briketts." By Adolf Berthold. Pp. 63; illustrated. 4x8½ in.; cloth, price 2 marks. Essen-Ruhr, 1906: G. D. Baedeker.

"Geological Survey of Canada. Annual Report of Investigations and Surveys, Vol. XV, 1902-3." Pp. 1133; illustrated. 6½x9 in.; cloth, 80c. Ottawa, 1906: Printed by S. E. Dawson.

"Compania Fundidora de Fierro y Acero de Monterey, S. A. Coal and Iron Mines." By Astolfo Bartoccini. Pp. 155; illustrated. 6x9½ in.; leather. Monterey, Mexico, 1906.

"Zeehan School of Mines and Metallurgy, Zeehan, Tasmania, Annual Report 1905." Pp. 170; illustrated. 5½x8 in.; paper. Launceton, Tasmania, 1906: Printed at *The Examiner* offices.

"Stray Currents from Electric Railways." By Carl Michalke. Translated and edited by Otis A. Kenyon. Pp. 101; illustrated. 5½x8 in.; cloth, $1.50 net. New York, 1906: McGraw Publishing Company.

"Die elektrochemischen Deutschen Reichspatente." Monographien über angewandte Elektrochemie, Band XXIV. By P. Ferchland and P. Rehländer. Pp. 230; 124 figs. 6½x9½ in.; paper, price 10 marks. Halle a. S., 1906: Wilhelm Knapp.

"Outlines of Qualitative Chemical Analysis." By Frank Austin Gooch and Philip Embury Browning. Pp. 145. 5½x8 in.; cloth, $1.25. New York, 1906: John Wiley & Sons.

Contents: The basic analysis. The acidic analysis. The systematic examination. Organic compounds.

"The Principles and Practice of Surveying." By Charles B. Breed and George L. Hosmer. Pp. 526; illustrated. 5½x9 in.; cloth, $3.00. New York, 1906: John Wiley & Sons.

Contents: Use, adjustment and care of instruments. Surveying methods. Computations. Plotting. Tables.

"Catechism on Producer Gas." By Samuel S. Wyer. Pp. 42; illustrated. 4½x6½ in.; cloth, $1 net. New York, 1906: McGraw Publishing Company.

Contents: Fundamental definitions. Producer gas and its manufacture. History and status of producer gas. Uses of producer gas. Cleaning of producer gas. Handling of gas producers. Construction of gas producers.

"Economics of Road Construction." By Halbert Powers Gillette. Second edition enlarged. Pp. 49; illustrated. 6x9 in.; cloth, $1 net. New York, 1906: Engineering News Publishing Company.

Contents: Historical review. Earth roads and earthwork. Gravel roads. Macadam roads. Telford roads. Repairs and maintenance. Suggested improvements in existing road specifications. Summary and conclusions.

"The Building and Ornamental Stones of North Carolina." By Thomas L. Watson, and Francis B. Laney, with the collaboration of George P. Merrill. North Carolina Geological Survey, Bulletin No. 2. Pp. 283, 23 pls., 11 figs. 7x10½ in.; cloth. Raleigh, 1906: E. M. Uzzell, Public Printer.

Contents: Preliminary generalities. The varieties of building stones. Dikes and veins penetrating the crystalline rocks of North Carolina. The calcareous rocks, limestones and marbles. The serpentines and verdantique marbles. Sandstones and quartzites. Dikes penetrating the sandstones. Methods of quarrying stone. The weathering of building stone. Stone for road building.

"Elements of Gas Engine Design." By Sanford A. Moss. D. Van Nostrand's Science Series No. 121. Reprint of a set of notes accompanying a course of lectures delivered at Cornell University in 1902, and of articles from *American Machinist, Machinery* and *Power,* with additions. Pp. 197; illustrated. 3½x6 in.; cloth, 50 cents. New York, 1906: D. Van Nostrand Co.

Contents: Chemistry and physics of gas engines. Gasification of coal. Gases not obtained from coal. Gas engine gas in general. Liquid fuels. Discussion and calculation of cylinder action—exhaust and admission. Compression. Combustion. Expansion and selection of speed. Power and efficiency. Methods of governing. Cylinder action in two cycle engines. Details of design. Formulas and constants for gas-engine design. Tables.

"Metallurgy of Cast Iron. A Complete Exposition of the Processes Involved in Its Treatment, Chemically and Physically, from the Blast Furnace through the Foundry to the Testing Machine." By Thomas D. West. Eleventh edition. Pp. 627; illustrated. 5x7½ in.; cloth, $3. Cleveland, 1906: Cleveland Printing Company.

Contents: The manufacture and use of coke. Properties in ores. Operations of blast furnaces. The different brands of pig iron and how to purchase and use them intelligently. Elements in cast iron and their physical effects. Utility of chemical analyses and how to use them in making the different mixtures of irons used in making gray and chilled castings. Properties of and methods for testing molten iron. Phenomena in the actions of cooling metal, etc. Results of tests on all kinds of irons and best methods for testing. Selected tables of utility for furnace and foundry work.

"The Design of Steel Mill Buildings and the Calculation of Stresses in Framed Structures." By Milo S. Ketchum. Second edition enlarged. Pp. 457; illustrated. 6x9 in.; cloth, $4 net. New York, 1906: Engineering News Publishing Company.

Contents: Introduction. Dead loads. Snow loads. Wind loads. Miscellaneous loads. Graphic statics. Stresses in framed structures. Stresses in simple roof trusses. Simple beams. Moving loads on beams. Stresses in bridge trusses. Stresses in a transverse bent. Stresses in portals. Stresses in three-hinged arch. Stresses in two-hinged arch. Combined and eccentric stresses. Graphic methods for calculating the deflection of beams. General design of mill buildings. Framework. Corrugated steel. Roof coverings. Side walls and masonry walls. Foundations. Floors. Windows and skylights. Ventilators. Doors. Shop drawings and rules. Paints and painting. Estimate of weight and cost. Miscellaneous structures. Appendices.

This is the second edition of a well known treatise, which has already met with well deserved appreciation among engineers. More than 100 pages of new matter has been added.

"Transactions of the American Electrochemical Society for 1905. Vol. IX." Pp. 400; illustrated. 6x9 in.; cloth. Philadelphia, 1906: American Electrochemical Society.

Contents: The electrochemistry of chemistry, W. D. Bancroft. An instructive laboratory experiment in applied chemistry, W. H. Walker. Some principles of the resistor furnace design, C. L. Collins, 2d. Electrolyte density in storage cells, L. Lyndon. Electrolytic corrosion of structural steel, M. Toch. Physical properties of fused magnesium oxide, H. M. Goodwin and R. D. Mailey. Cathodic disintegration of carbon in electrolyte of fused sodium chloride, G. I. Kemmerer. New silicide of molybdenum, O. P. Watts. The reduction of metal sulphides, O. W. Brown. Sodium production, E. A. Ashcroft. Laboratory Resistance furnaces, G. R. White. Electrochemical processes as station load equalizers, E. A. Sperry. The electric vacuum furnace, W. C. Arsem. Electrolytic corrosion of the bronzes, B. E. Curry. Observations on the corrosion of iron by acids, C. F. Burgess and S. G. Engle. The development of the nickel-plating industry, I. Adams. Electrolytic precipitation of lead from acetate solutions, R. C. Snowdon. A microscopic study of electro-deposits, C. F. Burgess and O. P. Watts. The cadmium standard cell, G. A. Hulett. Electrolytic precipitation of bronzes, B. E. Curry. Ferromanganese anodes in caustic soda solutions, G. R. White. The settling of suspensions, E. Buckingham. Migration and flocculation of colloids considered as an absorption phenomenon, H. E. Patten. The free energy of some halogen and oxygen compounds, computed from the results of potential measurements, M. DeK. Thompson. Report of experiments with fused sodium peroxide for the regeneration of air in submarines, G. F. Brindley and R. von Foregger. Lecture-room

switchboard, W. D. Bancroft. Alternating current electrolysis with cadmium electrodes, G. R. White. Electrolytic chromium, M. LeBlanc. The electrolysis of caustic soda, J. W. Richards. Differences of potential between manganese and lead peroxides and various aqueous and non aqueous solutions, L. Kahlenberg and A. S. McDaniel. A new electrolyte for the silver coulometer, H. S. Carhart, H. H. Willard and W. D. Henderson. Errors in pyrometry, E. S. Shepherd.

## Questions and Answers

LIBRARY ON COAL MINING

I noticed in the *Engineering News* sometime past a discussion of a library for the civil engineer, and would like your view on the same thing for the coal-mining engineer. The work is so varied, embracing as it does all the different branches of engineering, that it seems difficult to get a library that will meet all requirements. A. B. C.

*Answer*—The problems arising in coal mining are of such a varied nature that in order to have reference books on each separate and distinct subject the student would be put to great expense. Coal seams vary in thickness from 0 ft. to 40 ft.; they may be anything from horizontal to vertical, and may outcrop on the surface, or necessitate a 1000-ft. shaft. This gives rise to a complexity of systems so great that hardly any book on mining but contains some essential facts for the coal engineer. Perhaps the best small handbook pertaining directly to coal mining is "The Coal and Metal Miners' Pocket Book;" revised as it is each year, the information in it is brought carefully up to date. The pocket-book on mechanical engineering by Kent, also the one on civil engineering by Trautwine, are very essential for reference purposes. Fulton on "Coke;" Merriman's "Handbook on Surveying, "Johnson's "Theory and Practice of Surveying," Baker on "Masonry," Searles' "Handbook for Railroad Engineers," Kerr on "Coal Mining," and Foster's "Ore and Stone Mining" are excellent books for the coal engineer's library. The list could be extended and improved by the addition of many other excellent books along these same lines; but the list here given would form the basis for a useful library.

## The Guanajuato Drainage Tunne

The Mexican Engineering and Construction Company is pushing work on the "Porfirio Diaz" tunnel at Guanajuato, Mex. This tunnel, which will measure 7 m. wide by 7 m. high, is to pass under the city, and will when completed receive the flood waters from the valleys above the city, thereby preventing any repetition of the recent catastrophe.

Ten air drills receiving air from two motor-driven Ingersoll air compressors are to be used. The compressors are each 18¼x12¼x12 in., and the motors will each be of 50-h.p. capacity. Two motor-driven exhaust fans are to keep the tunnel ventilated as work progresses.

A 30-h.p. electrically operated hoist will be used to haul the loaded cars out of the tunnel on an incline to the dumping ground at the upper end. To perform the work in the least possible time, headings will be begun at both ends. At the lower tunnel end the loaded cars will run out by gravity to the dump. The electric power will be taken from the circuits of the Guanajuato Power and Electric Company. The electrical equipment for the work is being supplied by the Westinghouse company.

The United States Geological Survey estimates the production of sand and gravel in 1905, for various purposes, at 23,174,967 short tons, valued at $11,199,645. These figures are not complete, as a large quantity of sand and gravel, used for railroad ballast, road building and other purposes, is not reported.

## Patents Relating to Mining and Metallurgy

UNITED STATES

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which the notice of the patent appeared.

*Published Week Ended Nov.* 6, 1906.

HOIST—Charles E. Glessner, Ouray, Colo., assignor of one-half to Cooper Anderson, Telluride,, Colo. No. 834,901. Filed Dec. 30, 1905.

DEVICE FOR OPERATING TRIPPERS FOR BELT CONVEYERS—Elliott J. Mason and Lewis J. Robb, Pittsburg, Pa., assignors to Heyl & Patterson, Inc., Pittsburg, Pa. No. 834,921. Filed Jan. 22, 1906.

ELECTRICAL FURNACE—Frank J. Tone, Niagara Falls, N. Y. No. 834,948. Filed Sept. 14, 1905. Renewed April 6, 1906.

PROCESS OF PRODUCING MOLYBDENUM AND ITS ALLOYS—Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Company, of West Virginia. No. 835,052. Filed Feb. 1, 1906.

PULVERIZING MILL—John H. Elspass, Los Angeles, Cal., assignor to the Elspass Roller Quartz Mill and Manufacturing Company, Pueblo, Colo. No. 835,104. Filed Jan. 29, 1903.

ORE CONCENTRATION—Henry L. Sulman, Hugh F. Kirkpatrick-Picard and John Ballot, London, England. No. 835,120. Filed May 29, 1905.

ORE CONCENTRATION—Henry L. Sulman, London, England. No. 835,143. Filed Oct. 20, 1905.

ART OF CONSTRUCTING LINING WALLS FOR SHAFTS EXCAVATED IN THE EARTH—George W. Jackson, Chicago, Ill. No. 835,159. Filed June 12, 1906.

PLACER AMALGAMATOR — William H. Morgan, San Francisco, Cal. No. 835,195. Filed March 20, 1906.

METHOD OF AGGLOMERATING FINE ORES—Frank E. Bachman, Port Henry, N. Y., assignor to Northern Iron Company, Port Henry, N. Y. No. 835,232. Filed Jan. 31, 1906.

RETORT FURNACE—Peter Brown, Bellingham, Wash., assignor to Troy Chemical Manufacturing Company (Ltd.), Troy, Idaho. No. 835,237. Filed Oct. 24, 1904.

ROCK DRILL—Clark J. Smith, Ottumwa, Iowa, assignor to the Hardscog Wonder Drill Company, Ottumwa, Iowa. No. 835,261. Filed Aug. 12, 1905.

CONVEYER—William J. Patterson, Pittsburg, Pa., assignor to Heyl & Patterson, Inc., Pittsburg, Pa. No. 835,288. Filed July 13, 1906.

MEANS FOR PRECIPITATING GOLD AND SILVER—James Snodgrass, Johannesburg, Transvaal. No. 835,329. Filed Jan. 3, 1906.

COAL DUMP—Joshua G. Ball and Allen C. Higginbotham, Wake Forest, W. Va. No. 835,386. Filed April 6, 1905.

COAL WASHER AND ORE CONCENTRATOR—Alonzo C. Campbell, Asheville, N. C. No. 835,397. Filed Oct. 17, 1904. Renewed Sept. 14, 1906.

AMALGAMATOR — David McKelvey, New York, N. Y. No. 835,457. Filed Nov. 15, 1905.

ORE CONCENTRATION—Henry L. Sulman, Hugh F. Kirkpatrick-Picard and John Ballot, London, England, assignors to Minerals Separation, Ltd., London, England. No. 835,479. Original application filed May 29, 1905. Divided and this application filed Jan. 9, 1906.

*REISSUE*

COAL TIPPLE—James S. Pates, Monongahela, Pa., assignor, by direct and mesne assignments, to William W. Keefer; said Jas. S. Pates and Samuel A. Scott composing the copartnership of Coal Handling Machinery Company, Pittsburg, Pa. No. 12,553. Filed Sept. 8, 1906. Original No. 827,560, dated July 31, 1906.

GREAT BRITAIN

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

*Published Week Ended Oct.* 21, 1906.

ALLOYS — A. Jacobsen, Hamburg, Germany. Improvements in the inventor's alloys, described in patent 6945 of 1904, consisting of copper and zinc, with small admixtures of nickel, aluminum and iron. Nos. 19,198, 19,198A, 19,198B of 1905.

ALUMINUM BRONZE—C. Claessen, Berlin, Germany. Improved method of toughening aluminum bronzes by heating and chilling. No. 19,282 of 1905.

METAL REFINING—W. S. Simpson, London. In refining iron, copper and other metals by treatment under a vacuum, methods of agitating the crucibles so as to continually present new surfaces to the action of the vacuum. Nos. 19,781, 1,781A of 1905.

ZINC OXIDE—J. W. Worsey and E. Hoal, St. Helens. A variation in the process for producing zinc oxide from complex ores by roasting, dissolving in sulphuric acid and subsequently precipitating the oxide from the sulphate solution. No. 19,839 of 1905.

SULPHATIZING ORES—E. Enke, Kattowitz, Germany. In sulphatizing ores, especially zinc ores, adding acid sodium sulphate and ferrous sulphate, and heating the mixture with the exclusion of air to a temperature just sufficient to decompose the ferrous sulphate. No. 22,900 of 1905.

ROCK DRILL—R. H. Anderson, Johannesburg, S. A. An improved percussive rock drill, in which the head is separable and renewable in a novel manner. No. 25,158 of 1905.

COLLIERY DEVICE—J. Winter, Bishop Aukland, N. Z. Improved automatic device for securing colliery wagons in the cage. No. 3491 of 1906.

COUPLING—G. Gardner, Glamorgan. Improved coupling for mine cars. No. 5087 of 1906.

EXTRACTION OF LITHIUM—C. Poulenc, Paris, France. Extracting lithium in the form of carbonate by mixing powdered amblygonite with powdered acid sulphate of soda and heating. No. 9971 of 1906.

STEEL PROCESS—V. Defays, Brussels, Belgium. In the Siemens-Martin process for producing steel, heating the pig iron in the gas generators used in producing the gas used for heating the furnace. No. 9996 of 1906.

COAL WASHER—T. E. House, Wigan. Improved apparatus for washing coal. No. 10,840 of 1906.

## Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Herbert Kilburn Scott has left London on a professional trip to the Caucasus in Russia.

E. Nelson Fell, of the firm of Pellew-Harvey & Fell, London, England, is visiting Narcoossee, Florida.

L. M. Terry arrived in New York from Mexico recently, and expects to remain in the city for several weeks.

E. S. Brooks has resigned the position of superintendent of the Union Pacific coal mines at Hanna, Wyoming.

J. L. Englehart has been appointed chairman of the Timiskaming & Northern Ontario Railway Commission.

Anthony Blum, of Boston, has refused an offer for the Laurentian gold mine, Lake Manitou district, Ontario.

James W. Malcolmson has recently been engaged in professional work in Sonora, Mex. He intends soon to visit New York.

J. B. Ferguson, of Vancouver, B. C., managing director of the Western Oil and Coal Consolidated Company, is in Toronto, Ontario.

C. S. Herzig, of London, England, is at present in Siberia, examining a group of mining properties. He expects to return to London about Christmas time.

Wilbur E. Sanders, of Helena, Mont., has returned from a professional trip to British Columbia and Alaska, which occupied him several months.

Henry Stanley Renaud has opened an office at 159 Front street, New York, as consulting chemist and counselor-at-law in chemical patent and other cases.

Alfred B. Colwell, of Cripple Creek, Colo., and Edward L. Haff, of Portland, Ore., are now at Ely, Nev., as managers for H. K. Wheeler & Company.

W. S. Sultan, of Globe, Ariz., has resigned his position as superintendent of the Arizona Commercial Copper Company, having been elected mayor of Globe.

N. L. Amster, of Boston, is to become the president of the Shannon Copper Company. The offices of that company will shortly be removed from New York to Boston.

J. Fordyce Balfour, engineer for the Siamese Trading Corporation, has returned to London, after an extended tour through Siam and the Federated Malay States.

Frank C. Loring is now manager of the Tretheway Silver Cobalt Company at Cobalt, Ont. He is also engaged in consulting work in connection with other mines in the same district.

Edgar E. Barker, of San Francisco, recently with the Progreso Mines Company in Lower California, Mexico, is now engineering for the Globe Consolidated Mining Company, at Globe, Arizona.

Ben. B. Thayer, who represents the interests of H. H. Rogers in the Amalgamated property, has finished his inspection of the company's mines and returned to New York, leaving Butte Nov. 8.

W. D. Young, of Bay City, Mich., president of the Butte & Michigan Mining Company and a large lumber merchant of Michigan, arrived in Butte, Mont., Nov. 5, to inspect the property of the company.

H. B. Snell, who has recently been connected with the Old Dominion Company, at Globe, Ariz., has been appointed superintendent of the Arizona Commercial Copper Company, operating at the same place.

A. A. Ball, formerly treasurer of the Annie Laurie Mining Company, operating in the Gold Mountain, Utah, district, has become associated with the L. D. Gordon mining interests at Round mountain, Nevada.

J. W. Duntley, president of the Chicago Pneumatic Tool Company, sailed for Europe, Nov. 6, for a five weeks' trip in the interest of the company's business; he will visit England, Scotland, France and Germany.

Thomas F. Cole, president of the North Butte Company and identified with Butte Coalition and other large mining enterprises, spent several days in Butte, Mont., recently, examining mines in which he is interested.

W. C. Greene, president of the Greene Consolidated Copper Company, together with John T. Morrow, consulting engineer for the company, and other officials, have been visiting Butte, Montana. From there they went to Mexico.

Charles K. Cooper, who was chief engineer of the Mutual Life Company's buildings for 16 years, has resigned his position, and is now associated as consulting engineer with the American Air Compressor Works, New York.

We have received a letter from Reno, Nevada, containing some correspondence, to which the writer forgot to sign his name. If this item should come to his notice, we would be pleased to have him write to the JOURNAL further.

W. J. Palmer, who has been president of the Shannon Copper Company during the last year, severed his connection with that company at the annual meeting, Nov. 21. Mr. Palmer has associated himself with Wm. B. Thompson, of Hayden, Stone & Co., New York.

Robert T. Hill, formerly with the United States Geological Survey, and Frederick B. Irvine, formerly with the City and Country Contract Company, have formed a partnership under the firm name of Hill & Irvine. They will engage in general mining and civil engineering, at 25 Broad street, New York city.

N. V. Hansell, formerly connected with the American Gröndal-Kjellin Company, has formed a partnership with J. W. Hamilton, of New York. They have opened offices at 29 Broadway, New York, as consulting engineers, devoting their attention of the investigation of iron-ore properties.

## Obituary

Arthur Fordyce Rising, late in the employ of the General Chemical Company, of New York, and in charge of mines and construction at Hungerford, Canada, died suddenly at Portland, Conn., Oct. 10. The cause of his death was typhoid fever.

Patrick Macfadyen committed suicide in London, Oct. 21. It is understood that he was suffering from mental depression, owing to financial troubles. He was largely interested in mining enterprises. In connection with the Arbuthnots and H. G. Turner he operated a large manganese deposit in India, selling chiefly to the United States Steel Corporation. He was also interested in the Vizianagram and Dharwar goldfields in India and in mines in Arizona and in Mexico.

Prof. Edmund H. Miller died at his home, West Nyack, N. Y., Nov. 8, of typhoid fever. Professor Miller was born in 1867 and was graduated from Columbia College and the School of Mines with the class of '91. After a year of post-graduate work he began what proved to be his life's work and rose steadily from assistant in assaying to adjunct professor of chemistry when, in 1900, he was made professor of inorganic chemistry, and it is largely through his efforts that the department has attained its present state of efficiency. Students soon found out that Professor Miller was very strict in his examination requirements, but he was also noted for his fairness and impartiality. He knew his subject and was gifted with the ability to impart his knowledge to those under his instruction. He was responsible, either solely or by colaboration, for several books, among which were: "Quantitative Analysis for Mining Engineers," "Calculations in Analytical Chemistry," "Notes on Assaying," and a number of articles appeared under his name from time to time in various technical journals. He was a fellow of the Chemical Society of London, a member of the executive committee, of the Society of Chemical Industry, also of London, and a member of the American Institute of Mining Engineers and of the American Chemical Society. Professor Miller lost his wife about a year and a half ago. He is survived by two young children and a brother, who is instructor of drawing at Columbia University.

## Societies and Technical Schools

*Thomas J. Clarkson Memorial School of Technology*—This school, at Potsdam, N. Y., will celebrate its "decennial founder's day" exercises on Nov. 30, with elaborate exercises.

*Engineering Society of the University of Utah*—This society has organized for the year with R. A. Hart, president; Thos. Varley, vice-president; Samuel Ballard, secretary; Ray Needham, treasurer, and R. C. Fowler, historian. The executive committee is composed of Harry Moore, Earl Havenour, Fred Monahan and James Alley.

*Society for the Promotion of Industrial Education*—A public meeting to organize this society was held in New York, Nov. 16, and was largely attended. The objects of the society are to bring prominently to public attention the importance of industrial education as a factor in the industrial development of the United States; to provide opportunities for the study and discussion of the various phases of the problem; to make available through publications the results of experience in industrial education both in this country and abroad; and to assist in other desirable ways toward the establishment of institutions for industrial training.

## Industrial

The John Wahl Commission Company has removed its offices to No. 413 Merchants' Exchange building, St. Louis.

The Arthur Koppel Company, manufacturers of portable industrial and narrow-gage railroad material, with offices in New York and Chicago, has opened a new sales office in Pittsburg, Penn., in the Machesney Building, Fourth avenue. This will become the main office for the trade in the Western and Southern States.

The John A. Traylor Machinery Company, of Denver, Colo., has just booked an order from the Utah Copper Company for 72 two-compartment standard all-iron jigs. These people have just completed an addition to their machine shop which will greatly increase their output of Imperial ore screens and centrifugal pumps.

The Harbison-Walker Refractories Company, of Pittsburg, Penn., has taken over the selling organization of the Portsmouth Harbison-Walker Company, and in the future all brands of brick, etc., made by the Portsmouth Harbison-Walker Company will be sold by the Harbison-Walker Refractories Company direct from its Pittsburg offices.

The American Manufacturing Company, New York, gives notice that owing to the present condition of the manila-hemp market, especially the first grade, the price of "American" transmission rope is advanced ½c. per pound over the present prevailing rate, and all indications point to a further increase in the near future. This schedule of rates will become effective on and after Nov. 15. All orders received in the meantime will be booked at previous prices.

The Buffalo Forge Company, Buffalo, N. Y., has received a large order for a complete shop equipment to go to Sumatra. There will be 14 large forges in four different styles or types suitable for the various classes of work to be performed, most of it being large, heavy work. All of these forges are to be equipped with the Buffalo down-draft smoke-exhaust system. The order includes the necessary blowers and exhausters for furnishing the blast and removing the smoke.

The permanent organization of the Wilkinson Steam Turbine Company has been effected and arrangements for putting its products on the market are being completed. It will build steam turbines and allied machinery under the inventions of James Wilkinson, formerly of Birmingham, Ala. The Wilkinson turbines will be built at the Corliss Steam Engine Works, Providence, R. I., and the executive office of the company is at that place. New York and other offices will be established in due season.

Through G. & O. Braniff & Co., agents for the Westinghouse Electric and Manufacturing Company, Pittsburg, a large and very modern electrical plant for lighting and power is being installed by the Oaxaca Smelting and Refining Company, of which O. F. Westlund is manager. It includes a 110-kw. alternating-current Westinghouse generator, 440 volts, 60 cycles, steam-engine driven, with exciter, switchboards, etc., at the generating station. Transformers will be used to supply the arc and incandescent lights. The motor-driven centrifugal pumps are of the Byron Jackson make and the triplex are made by the Allentown Company.

## Trade Catalogs

Receipt is acknowledged of the following catalogs and circulars:

American Skylight and Iron Works, Jersey City, N. J. Pp. 20, illustrated; paper, 6x9 in.; 1906.

Leede Process Company, Philadelphia, Penn. Something New in Gas. Pp. 40, illustrated, paper, 3x9 in. 1906.

Scully Steel and Iron Company, Chicago, Ill. Stock List, Nov. and Dec. 1906; Pp. 144, illustrated; paper, 4½x7 in.

Standard Sanitary Manufacturing Company, Pittsburg, Penn. Modern Sanitation, Oct. 1906. Pp. 31, illustrated; paper, 7x10 in.

Syracuse Smelting Works, New York and Montreal, Canada. Anti-Friction Babbitt Metal; Pp. 54, illustrated; paper, 3½x6 in. 1906.

The Case Manufacturing Company, Columbus, Ohio. Bulletin No. 22, Electric Cranes; Pp. 28, illustrated; paper, 9x12 in.; 1906.

A. D. Granger Company, New York City. Bulletin No. 2, Second Edition, Star Safety Water Tube Boilers; Pp. 28, illustrated, paper, 9x5 in. 1906.

The Williams Patent Crusher and Pulverizer Company. Sales Department, Chicago. Ill. Coal Crusher Edition; Pp. 58, illustrated; paper, 6x9 in.; 1906.

Ingersoll-Rand Company, New York, N. Y. Bulletin No. 2011, Labor Saving Tools operated by Compressed Air; Pp. 20, illustrated; paper, 6x9 in.; 1906.

American Locomotive Company, New York. Consolidation Type Freight Locomotives Weighing less than 175,000 lb. Pp. 72, illustrated; paper, 9x6 in.; 1906.

Allis-Chalmers Company. Milwaukee, Wis. Bulletin No. 1508, Sept. 1906. Christensen Straight Air Brake Equipments. Pp. 12, illustrated; paper, 8x10½ inches.

Ohio Brass Company, Mansfield, Ohio. Monthly Bulletin, November, 1906. Illustrated; Pp. 12, paper, 6x9 in. Car Equipment Specialties. Illustrated; Pp. 16, paper, 6x3½ in.; 1906.

## Construction News

*Elkhorn District, Oregon*—The mill at the Maxwell mine is to be enlarged. W. Henry Harris, Baker City, Oregon, is manager.

*Humboldt, Arizona*—The Pick & Drill Mining Company proposes to put in a new mill shortly. The address of the company is Prescott, Arizona.

*Baker City, Oregon*—New machinery will probably be put in at the Tom Paine mine, 10 miles west of Baker City. W. F. Grover, of that place, is owner.

*Elberton, Georgia*—The Swift Granite Company has leased property from the Elberton Granite Company, and will need drills and other quarrying machinery.

*Stockton, Utah*—The New Stockton Mining Company, J. J. Trenam, of Salt Lake, manager, will shortly double the capacity of its mill which is being operated at the mine.

*Beaver County, Utah*—The mill at the Cactus mine is to be doubled in size. At present it has a capacity of 800 tons a day. Samuel Newhouse, Salt Lake City, is president of the Newhouse Mines and Smelters Corporation, which owns the Cactus mine.

*Leadville, Colorado*—The Dinero Consolidated Mining and Tunnel Company intends to install a large electric plant on its property, to operate compressors, hoists, haulage and other machinery. Dudley M. Gray, Leadville, is manager. The general offices of the company are in Kansas City, Missouri.

## Special Correspondence

### San Francisco Nov. 8

It is understood that the California King Gold Mines Company at Picacho, San Diego county, will shortly resume operations. The plant and mines of the corporation were sold under foreclosure some months since. A large mill was built on the Colorado river, and a railroad to connect the mines and mill. The mill is to be overhauled and put in good condition and the railroad also repaired. This company started out with great expectations and with prominent names in its directory, but it never paid any dividends and in fact has almost always been in some kind of difficulty. Those who believe in the value of the properties will now be given a chance to prove their value by practical work.

The gravel mines throughout the State are all awaiting the first rains to get their run of water. Many improvements have been made in numbers of claims, such as reservoirs built, pipe and ditch lines extended, etc., so as to permit of the washing of larger quantities of auriferous material during the water season.

The Lightner Mining Company of Angels, Calaveras county, in paying its dividend last month, made a total in that direction of $452,083. The total sum taken out since the last starting up of the mine has been $1,791,432, all of which, except the sum mentioned as dividends, has been paid out for labor and improvements. A fire some time since injured the plant materially and considerable expense was entailed in replacing it. Alexander Chalmers, the successful manager and superintendent for some years, was not originally a mining man, but was in business in Stockton, Cal., when he bought stock in the company. The property had not been successful and he was chosen to "pull it out of the hole." With no knowledge of mining affairs he took hold of the property and very shortly put it on a dividend-paying basis on which it has since continued.

Del Norte, one of the northwestern coast counties of the State, is at this late day congratulating itself on the establishment of a chemical and assay laboratory at Crescent City, by the Del Norte Mining and Development Company. In many places in the county are promising indications of mines of various kinds, including gold, platinum, copper, quicksilver, nickel, iron, etc. Gold and platinum in small quantities have been mined since 1849, and some little work has been done on other properties. The newest locality for mining is in Smith river, where the auriferous sands are supposed to contain much more platinum than the ordinary Pacific coast river sands. The new coast railroad is expected to advance greatly the mining industries of Del Norte county, which has always suffered for lack of transportation facilities.

It is supposed that the Bodie & Benton (Mono county) railroad will shortly pass into control of Tonopah men. The road runs around the eastern shore of Mono lake from Bodie to Mills. In the event of a sale the new owners will run a broad-gage track from Sodaville to Warm springs, near the edge of Mono lake, and a third rail will be laid from there to Mono Mills. Wood, lumber, etc., will be brought to Bodie, as formerly, over the narrow-gage line. The broad gaging of a line to Warm Springs from Sodaville will mean the connection of Bodie with the outside world, after over 30 years of its existence as a mining town.

The citizens of Marysville want to change the course of the Yuba river as precaution against floods, and to keep the debris in place. The river in that section is filled many feet deep with debris from old hydraulic mining operations. Although there are high levees on both sides of the stream the flood plain is rising year by year. They plan now to "lose the Yuba," by changing its course, but the engineers of the Debris Commission think the undertaking is too costly. Col. W. H. Huer, of the commission, says: "The United States Government has nothing to do with the project. It is a local and State enterprise. The result of the plan would be simply to make a new mouth for the Yuba. The material now carried down is deposited in the Feather river near the Yuba. If a new mouth is made the debris will go farther down the Feather. That would have the effect of reducing the floods at Marysville. It would make a bar farther down stream. Some day the Government might wish to improve the Feather to provide navigation to Marysville. Then it would be necessary to remove the new bar. For years the navigation of the Yuba river has been insignificant."

There is quite an excitement in the copper camps of Saline valley, Inyo county, and prospectors by the hundreds are going in from Big Pine, Keeler, Rhyolite, and other places. Locations are being made which will cover the whole mineral belt in the hope that capitalists will buy, as they are doing at Greenwater in the same county. Ubehebe district, in Inyo county, is being prospected also by many men, keeping the county recorder busy recording claims.

On the White Rock or Blakiston property, four miles from Placerville, El Dorado county, a gem-mining company is now taking out large quantities of crystals of white or straw color, having much brilliancy, and a strong reflecting power; they are used as a substitute for diamonds. They are called by different names—Bristol diamonds, French or Brazilian pebbles and Oriental topaz, and differ materially from the ordinary quartz crystals. They are found only in the place mentioned, and there appears to be an almost unlimited quantity of them. The "gems" occur in a ledge of partly decomposed material, filled with a reddish dust, and vary greatly in size. The company is developing the property, and preparing to carry a stock of the "gems" in many large business centers.

A wagon road is to be built from the bridge on Walker river, near Conway's, to Masonic district, Mono county, by means of which mining machinery and supplies may be hauled in. It is expected within a year a railroad will be extended to the district, but the wagon road will serve a very useful purpose for the present.

Tonopah is not satisfied with telegraph wires to San Francisco, so plans have been completed by the Occidental & Oriental Wireless Telegraph Company to install a wireless service with San Francisco.

An experiment in planting fig trees on the rock-tailing piles of the dredgers at Oroville, Butte county, is pronounced successful, and this is given as a demonstration of the horticultural possibilities of such material after the gold is extracted. Another way of utilizing the rock piles is to level them by machinery and sell off building lots. Machinery for doing this has been ordered, and will be run by electric power. The beginning in the leveling of the huge piles of rock that have done so much to bring dredging into disrepute will be made on the Gardella tract, at Oroville. .

T. E. Driskell's suit for $5000 damages against the Lassen Mining Company, of Hayden Hill, Lassen county, alleging that the club room established by that corporation for the benefit of its workmen has about ruined his saloon business in that place, is regarded as one of the most singular pieces of litigation on record. If successful, it would seem to mean that neither individuals nor companies can do anything for the benefit of their employees outside of regular lines, if it can be shown that by so doing someone's business is damaged. The mining company operates the Golden Eagle mine at Hayden hill, which is owned mainly by Leon and Louis Sloss, and E. H. Hunt. E. H. Benjamin, formerly president of the California Miners' Association, is consulting engineer and manager for the company. The company will fight the suit, contending that it is no saloon-keeper's business as to what accommodations and amusements they furnish for their employees.

### Salt Lake City Nov. 3

The ore and bullion settlements reported by Salt Lake banks during October w re greater than any previous month in the history of mining in this State, amounting to $3,567,600. This business does not include, however, the transactions of the concerns which reduce their own ore to bullion.

The dividends paid by Utah mining concerns last month reached a total of $506-

630, the contributing properties being: United States, $366,630; Silver King, $50,000; Beck Tunnel Consolidated, $30,000; Mammoth, $20,000; Grand Central, $15,000; Victoria, $10,000; Carisa, $5000; Sacramento, $5000; Utah (Fish Springs), $5000.

Articles of incorporation of the Surprise Mining Company have been filed, a group of claims in the American Fork mining district forming the basis. C. W. Earl is president and Joseph H. Wooten, of American Fork, is secretary.

The Weber County Mining and Milling Company, with headquarters in Ogden, Utah, has been launched to develop a group of claims in Weber county. Albert Scocroft is president; Moroni Poulter, vice-president; and A. G. Maw, secretary.

The Holderman Filter Tank Company is operating a mill successfully on a tailings dump for the Consolidated Mercur Gold Mines Company, and is about to install other plants in Nevada, Idaho and Colorado.

The General Engineering Company, of Salt Lake, has been conducting a series of tests for the Tomboy Mining Company, of Telluride, Colo.

The South Columbus Consolidated is the name of a strong company just formed to operate at Alta, arrangements having been made to take over the properties operated heretofore by the South Columbus and Alta Quincy companies. The company will have 300,000 shares of a par value of $5 each; 100,000 each are to go to the shareholders of the South Columbus and Alta Quincy, the balance remaining in the treasury.

The mining and smelting companies of Utah are confronted with a grave situation, namely, a shortage of fuel. Many of them have been greatly handicapped by a shortage of cars, and the inability of railroads to handle the traffic; the outlook for the future is anything but encouraging and a rather hard time of it is anticipated during the winter. This condition has also had the effect of curtailing ore shipments from the mines. Some talk of effecting an organization of mining and smelting men has been indulged in, to determine if there is not some way whereby this unpleasant state of affairs may be overcome. There is no scarcity of coal at the mines, the coal companies declare; but that it is only a matter of giving them enough cars to keep the demands supplied.

The Tintic Mine Operators' Association has notified the officials of the Rio Grande Western and the San Pedro, Los Angeles & Salt Lake railroads that the recent concession in freight rates on ore shipped to Salt Lake valley points is still unsatisfactory; that they continue to discriminate in favor of other camps within their territory. The association claims to have a clear case against the last named road and the case may be called to the attention of the Interstate Commerce Commission.

Samuel Newhouse, president of the Newhouse Mines and Smelters Corporation, operating the Cactus copper mine in Beaver county, has given out the information that the capacity of the company's mill is to be doubled. It is now treating 800 tons per day. The changes are to be made, Mr. Newhouse says, within the next four months. In the meantime the management is going ahead with the construction of additional mine buildings for the accommodation of an increased force of men. The improvement is a consequence of the late sensational developments in the Cactus mine. The new orebody is 280 ft. wide on the 500 level and carries copper values of 2½ per cent.; on the 600 the grade has improved, both in copper and in gold and silver. Drill holes put down for over 200 ft. show a continuance of the same condition.

At a special meeting of shareholders of the Silver Bell Mining Company, operating at Park City, the capital stock was increased from 250,000 to 1,000,000 shares.

Shareholders of the Big Cottonwood Copper and Gold Mining Company, of which N. Treweek, of Salt Lake is president, have authorized the capital stock increased from 300,000 to 750,000 shares, making the same non-assessable. The company owns about 200 acres in the Big Cottonwood district and is carrying on development along broad lines.

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## Denver Nov. 9

Although the fact is still being denied by some who are supposed to know, it is still generally believed that an option on a controlling block of the stock of the Portland Gold Mining Company has been given to an Eastern syndicate. James F. Burns, who expects to file an amended petition in the District Court, would hardly openly charge the fact in court unless he had good reason for doing so.

The output of the Cripple Creek district during the past week or so has increased to such an extent that there is a serious car shortage in the district, and this month promises to be a record breaker.

The independent smelter, at Salida, is being enlarged to a considerable extent, two new furnaces being installed, and the sampling works remodeled. The output of this plant, which handles ores not only from Colorado, but from Utah, Idaho and Wyoming also, amounted to nearly $1,500,000 during 1905.

Up to date, the Federal Government has purchased about 5,000,000 oz. of silver for subsidiary coin purposes, and will probably need about 3,000,000 oz. more. Last week 300,000 oz. were purchased at a slight advance over 70 cents.

With a capitalization of $200,000 the Phelps-Dodge interests have just incorporated a company to build a railroad from its coal mines, near Dawson, New Mexico, just across the Colorado line, to Corona, in Lincoln county, situated on their El Paso & Southwestern railway. The company is named the Dawson, El Paso & Southwestern Railroad Company.

S. J. de Lan has filed a suit in the United States District Court against Thomas F. Walsh and the Venture Corporation, Ltd., for commission to the amount of $287,500 on the sale of the Campbird mines, alleging that he negotiated the same by bringing the parties together.

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## Duluth, Minn. Nov. 11

Lake iron-ore shipments continue as heavy as possible, but the volume of tonnage moved is diminishing steadily, and will scarcely be over 3,500,000 tons for the entire lake region for this month. That will make a total to December of 36,700,000 tons, which is about the amount that furnace men can expect for the year unless there is more good weather in December than customary. With last year's experience in mind vessel owners will be exceedingly careful as to storm signals this fall and early winter. At all lake ports train crews are as busy as ever, and while many mines on all ranges have ceased shipments, being cleaned up, there are enough that are still pushing to make the totals foot up.

It is safe to say that Old Ranges will make no material increase in 1907; indeed many Mesabi districts can scarcely add much to present product without undue expense.

A stripping operation of considerable magnitude is under consideration by the Oliver Company, for the vicinity of Eveleth. It has been testing the west half of section 36-58-18, known as the Leonidas, and held under State contract, and expects to strip that as well as 40 acres a mile away to the east. A considerable addition will be made to the present stripped area of the Adams, which lies between these two properties. Several million yards will be moved.

The Oliver Iron Mining Company is equipping its new steel shaft at the Chapin mine, the Ludington C. It has ordered two hoisting engines, one to be for cage hoisting a single-cylinder Corliss reversing, 30x60 in., running at 60 r.p.m. The drum is horizontal, 12 ft. diameter and 10 ft. face. The skip hoist is to be duplex reversing Corliss type, 34x72 in., running at 50 r.p.m. The drum is similar to that of the cage hoist and the capacity of the engine is a 10-ton load from 3000 ft. underground, the hoisting to be performed in about one minute. Steel and brick engine-houses, of the standard Oliver type, are now being constructed for this plant. It is intended to have this operation a model for economy and efficiency in every detail.

The deepest stripping yet undertaken on the Mesabi range will be that of the large Shenango mine, of the Shenango Furnace Company. The company is seriously con-

sidering stripping this property, in order to make it an open pit mine by 1908. There is a thickness of 108 ft. of overburden above ore at this property, making the operation an important one. The customary steam shovel operation will be carried on in this stripping. There are comparatively few mines on the Mesabi range with an overburden of 100 ft., or over.

Already guesses of 40,000,000 tons for the coming year are in evidence. These are probably based more or less on the expectation that the Oliver company will mine very heavily on the Hill tracts recently secured, as well as on the belief that the new western Mesabi district around Coleraine and Holman will be the heavy producers anticipated. Neither is probable. Unless unexpectedly rapid work is done elsewhere along the Hill lands, the bulk of 1907 production therefrom will be out of the Leonard mine, which is a milling property with a comparatively small and very deep pit. It will be difficult to so enlarge Leonard pit as to make mining a large tonnage easy there next year, and it has not been the custom of the Oliver company to push any mine beyond an economical production.

The deal of the New York State Steel Company for the purchase of the lease of section 9-58-16, has been closed and superintendent Kendall is now buying material and machinery preparatory to opening a mine there. This will be called the Kellogg, in honor of the president of the steel company, and will be a considerable shipper next year. This deal has received considerable attention on account of the fact that it is for the highest royalty ever paid in the Northwest, $1 per ton. There has been found on the land to this time about 2,500,000 tons of merchantable ore, averaging about 61 per cent. iron and low in phosphorus, and the tract is by no means fully explored, so that the fortunate fee-owners are liable to receive three or four millions for their ore in the ground. The mine will be underground and is not supposed to have very much water or quicksand. The same company is now exploring in 56-23, in a locality that presents excellent possibilities, but where the royalties are very much lower.

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**Scranton** Nov. 12

Thomas D. Nicholls, president of District No. 1, of the United Mine Workers, was elected congressman from Lackawanna county, defeating the present member, Thomas H. Dale, Republican, by more than 6000 votes. It is about 20 years since the district was represented by a member other than a Republican. Mr. Nicholls, although a Republican, was nominated on the Democratic ticket, in the interests of the labor movement. Mr. Dale, the present representative, made a speech in the last congress asking for the establishment of a bureau of mining. In the same county five out of the six representatives to the State legislature were elected by the mine workers on the Democratic ticket. Secretary-Treasurer W. B. Wilson, of the United Mine Workers, was also elected congressman from the fifteenth district, defeating the Republican member, Elias Deemer.

Thirty years ago a suit was started by the Reading Coal Company to restrain Lawrence, Merkle & Co; from mining coal underneath the Mahanoy Plane, near Shamokin, for the reason that it would be unsafe to run cars over the plane, if the coal were removed. Judge Bechtel, who was appointed master in the proceedings, died recently, and Hon. James B. Reilly was appointed to succeed him last week, to continue the work of taking testimony.

The members of the Scranton Engineers' club went to Berwick, Penn., on Nov. 10, as the guests of the York Bridge Company, which is erecting one of the largest highway bridges in the state, to span the Susquehanna river between Berwick and Nescopeck. The visitors were shown over the structural work.

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**Toronto, Ont.** Nov. 9

The Timiskaming & Northern Ontario Railway Commission has, to a certain extent, met the views of mining men who have been desirous of obtaining official statements of ore shipments at short intervals. They have recommended to the Provincial Government the publication of monthly statements, considering that shipments were hardly of sufficient frequency to necessitate weekly reports. In all probability the recommendation will be approved. This, while satisfactory to the big shipping companies, will not be at all welcome to the promoters who have in hand propositions that have not reached the shipping stage—and may possibly never do so.

The Provincial Government has extended for five months, or till April 1 1907, the loan guarantee to the Canadian Improvement Company on behalf of the Sault Ste. Marie industries. The company endeavored to arrange with prominent financial firms for the taking up of the guarantee of $1,000,000, which expired Nov. 1, but was unable to do so in time. The company will pay six months' interest now due, and may possibly be able to take up the certificates before the date fixed by the extension. The original guarantee was for $2,000,000, half of which was taken up in May last.

With the setting in of cold weather, accompanied by considerable falls of snow, in the Cobalt area and the districts lying farther north, the season for prospecting has come to a close, and little more can be done until spring. It appears altogether probable that the rush, which is sure to set in as soon as the ground is clear, will be mainly in the direction of Larder lake, to which the stories of returning prospectors are directing much attention. Cobalt and neighborhood have ceased to offer opportunities for the poor prospector since the big corporations and syndicates have taken possession and with the opening up of the district farther north by railway the mass of prospectors will look farther afield. The question of whether the gold of the Larder lake field occurs in quantities sufficient to make the discoveries commercially valuable is still regarded by experts as unsettled. It is admitted that picked samples show high values when assayed, but it is contended that where gold occurs at all, it is easy to secure such specimens, which do not necessarily prove that the claims will be commercially workable.

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**London** Nov. 3

It takes a long time to root out a financial swindle in London, and in fact not one in a thousand ever comes to a well deserved end, but when the law does catch the conspirators, it cannot be denied that the punishment fits the crime. Years ago I referred in these columns to the peddling of shares in a company called the American Mining, Milling and Smelting Company, a corporation alleged to be registered in South Dakota and with its head offices in St. Louis. These shares were being sold by people hiding behind the name of Weston & Co., having offices in the heart of the city. The inducements held out out were most favorable, for among other things monthly dividends were being paid at the rate of 180 per cent. per annum. One of the financial papers advertised it largely, and its business flourished. Shares were sold readily and at high premiums, and for a time at any rate dividends were paid out of capital. Finally one of the conspirators, an American, who was probably the leader, found it more convenient to reside abroad and the remaining two, Young and Jonas, both Englishmen, had hard work to continue the farce. Finally, the account of the company given by Horace Stevens in his "Copper Handbook," opened the eyes of shareholders here and a criminal action for obtaining money by false pretenses was brought against them. After a trial lasting four days a verdict of guilty was given and Young received ten years and Jonas 18 months. It is always after the event that investors became wise, so shareholders were quite surprised to learn that Young had six years' penal servitude before for raising money on forged title deeds, and that Jonas had once been a lawyer but had been struck off the rolls for apropriating clients' money and is at the present time an undischarged bankrupt. It is to such men, backed up by a financial paper, acting innocently or in concert—I won't pretend to say which—that the British public hand their money in blind faith.

At the beginning of the present year I mentioned that the Mining Exploration

Company, owning properties in the Andes, between the Argentine and Chile, about 150 miles southeast of Santiago, was issuing shares to supply necessary working capital, after having carefully prospected and developed the property for a few years previous. The company is now making a further issue of £75,000 for the purpose of equipping the smelter and completing the roads and railway. The company owns such promising property, and is in such a satisfactory position, that a few notes relating to it will be of interest. The company owns three properties. One is the Choicas, which has been worked for 20 years on a small scale by local owners. About 500 tons of ore picked to 25 per cent. copper was shipped each season and sent by muleback for 65 miles to the Chilean State railways, and subsequently to smelters in Wales. During the last three years developments by the English owners have opened up large bodies of ore of varying grades, and it is proposed at first to smelt ore averaging 7 per cent. copper. Of this ore there is enough blocked out to last three years, at the rate of 100 tons a day. The workings have not yet gone far down, nor has more than a small portion of the outcrop been prospected. The second property owned by the company is the Victoria, which has not yet been opened up in depth, but along the outcrop the ore blocked out already amounts to 50,000 tons of 10 per cent. ore. The third property is the Huanaco, on which there are very large bodies of low-grade ore similar to the Bingham deposits in Utah. At first, the communication will be by means of traction engines along a specially built road to the railway, but later on a branch line will run to the mines and smelter. The smelter is now being supplied by the Allis-Chalmers company, and should be in working order in the spring. I should add that the nature of the deposits described above is vouched for by William Rich, late of Rio Tinto, cousulting engineer to the company.

### Sydney, N. S. W. Oct. 15

*Gold*—The following is the gold yield in fine ounces of the three principal Eastern States of Australia for the first nine months of 1906: Victoria, 570,447 oz.; New South Wales, 195,885 oz.; Queensland, 391,244 oz.; a total of 1,157,576 oz. This is a net increase of 5835 oz. on that for the same term in 1905; Victoria shows an increase of 44,280 oz., and New South Wales 6597 oz., but Queensland exhibits a decrease of 45,042 oz. The Bendigo field, Victoria, maintains place as the chief producer. The shaft at the Victoria quartz mine is down 4300 ft., and in driving east at a depth of 4154 ft. quartz carrying gold was intersected by the east crosscut.

## General Mining News

*Sault Ste. Marie Canals*—The tonnage passing through the canals at the Sault in October was 7,201,078 tons. For the season to Nov. 1 the total freight was, in short tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| East-bound..... | 31,608,316 | 35,917,954 | I. 4,309,638 |
| West-bound..... | 6,385,614 | 8,487,561 | I. 2,101,947 |
| Total..... | 37,993,930 | 44,405,515 | I. 6,411,585 |

The total number of vessel passages this year was 19,462, showing an average cargo of 2282 tons. The mineral freights included in the total were as follows, in short tons, except salt, which is in barrels:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Anthracite..... | 749,322 | 823,800 | I. 74,478 |
| Bituminous..... | 4,849,791 | 6,495,056 | I. 1,645,265 |
| Total coal..... | 5,599,113 | 7,318,856 | I. 1,719,743 |
| Iron ore..... | 27,852,943 | 31,307,915 | I. 3,454,972 |
| Pig & manuf. iron | 182,958 | 308,041 | I. 125 083 |
| Copper.. ..... | 86,414 | 88 641 | I. 2,227 |
| Building stone.... | 8,649 | 6,222 | D. 2,427 |
| Salt, bbl..... | 357,147 | 404,688 | I. 47,541 |

The chief gains this year were in iron and coal.

### ALASKA

KUSKOKWIM RIVER

Advices from Valdez state that a property on the Kuskokwim, about 300 miles from its mouth, and near the old Russian post of Kolmaroff, has been bonded to Eastern parties. It is said to contain a deposit of cinnabar.

TURNAGAIN ARM

The hydraulic mines near Sunrise have produced about $30,000 in gold this season. The two important mines are that of S. W. Wible on Cañon creek, and the Elmore at the junction of Cañon creek and East fork. The Elmore is in charge of M. H. Sullivan.

### ARIZONA

YAVAPAI COUNTY

A preliminary survey has been made, by some of the property holders in the vicinity of Senator, for an electric railway to connect that place with Prescott; they are now busy trying to interest capital in the construction of the line.

*New England-Arizona Gold and Copper Company*—This company has just purchased a 14x16 steam hoist and a 70-h.p. boiler to add to the equipment of the mine near McCabe. The shaft has now attained the depth of 175 ft.; the orebodies are improving in both size and quality with depth. The values are copper and gold, gold predominating. This mine will soon be in the shipping class.

*Pick & Drill Gold Mining Company*—This company, of Prescott, has opened a new shoot of ore in its mines near Humboldt. The new strike shows ore 3 ft. wide. From different assays made, the average of this ore is near $50 per ton, the value being chiefly gold. The company will install a larger mill in the near future.

### CALIFORNIA

CALAVERAS COUNTY

*Nassau*—This copper mine, near Pool's station, on the Angels & Milton road, is shipping 10 tons of ore daily, which is hauled by team and traction train to Milton, and thence to the Selby smelter. The company is preparing to sink a new shaft 400 ft. south of the present workings.

EL DORADO COUNTY

*Jones Hill*—Operations have been commenced by W. S. Kerr on this placer mine with Henry Ward as superintendent.

*Big Cañon*—This mine, near Shingle, which has been idle for several years, is about to resume operations, and a new 20-stamp mill has been ordered by the company. The mine was formerly called the Oro Fino, and was last worked by Hayward & Lane.

*Cambrian*—This mine, near Lotus, owned by Dr. E. Davis, has been sold to Henry Stratten.

INYO COUNTY

*Dunlap*—Work on this group in the White mountains is being vigorously prosecuted, and a new camp has been established there.

*Sanger*—This copper property in Saline valley has been placed under bond, and a cash payment made on it.

*Furnace Valley Copper Company*—This new company, south of Greenwater, is about to commence extensive development work. The surface showing is reported as excellent.

MADERA COUNTY

*Old Frenchy*—Fritz Paabsch and Bruce Manners have located a mine by this name between the forks of Iron Creek, near the Iron Mountain Monument. It is supposed to be the old "lost" mine of the same name.

MARIPOSA COUNTY

*Old Mine*—Henry Marcus, of San Francisco, while employed on the survey of the Yosemite railroad, found an old abandoned mine on which is a shaft 300 ft. deep. Free gold was found in the ore. The claim is near the Merced river, 40 miles from Yosemite valley.

MONO COUNTY

*Indian Queen*—At this once noted mine, northeast of Benton, W. D. Clair has a force of men at work for a Boston company. The old shaft, 250 ft. deep, has been pumped out, and development work is progressing.

NEVADA COUNTY

*New York-Grass Valley Mining Company*—A new 100-h.p. Pelton wheel, and a new electrical motor are to be installed, and the capacity of the Merrall's mills is to be increased. The new plant will have a capacity of 150 tons of ore per day. This was formerly the Perrin mine.

*California*—This old mine at Deadman's Flat is being reopened. The old machinery

has been replaced by new, which will be operated by electric power.

PLACER COUNTY

*Ophir Valley Mining Company*—This company has bought the Ophir valley group of mines, a consolidation of the Hathaway and Butts, and Eureka and Kirkland properties, some of which are developed to 800 ft. depth. The company is making extensive changes in the 20-stamp mill, the power being changed from water to electricity. Asa B. Eastwood is superintendent.

PLUMAS COUNTY

*Cleveland*—In this mine at Greenville, owned by G. B. Cozzagies, a well defined ledge carrying high values has been found. It is supposed to be the best showing yet made in the Greenville-Crescent mineral zone. The locality is one where mining has been carried on for some 55 years.

*Five Bears*—The tunnel in this mine on Ward creek is now in 1100 ft., and the high line ditch has been finished. The ore at present encountered is of high grade.

*North California*—The Wolf Creek holdings of this company, near Greenville, will soon be worked, it being the intention to run a tunnel to tap the gravel channel. This creek produced large amounts of gold in the early placer-mining times.

SAN BERNARDINO COUNTY

*Gold Metal*—This company has bought from D. P. Wright several groups of undeveloped quartz claims in Morongo district.

*Bonanza Consolidated*—This company has purchased from J. K. Bell and others 11 mining claims in Clipper Mountain district, five miles from Danby, including the Tip Top claim.

*White Cross*—This company has leased from the Ludlow Mining Company 27 claims in Vanderbilt district, with a privilege of purchase. The deal gives the White Cross Company control of the properties of the Ludlow company in the district.

SAN LUIS OBISPO COUNTY

*Silver Swan*—On this copper mine, Chorro creek, I. Holdt has run a tunnel 300 ft., and found good ore.

SHASTA COUNTY

*Mammoth*—This company at Kennett is now employing more men than ever before in its history, the present number on the pay-rolls being 395. The plant is being materially increased in size.

SIERRA COUNTY

*Gumboot*—York, Watson & Wilder have sold their interests in this placer mine to A. G. Bill, H. B. Tiedman and T. J. Dolan.

*Alaska*—This company, at Pike City, in doing drifting on the Casserly ledge has come across specimen ore in a small vein. The vertical shaft to tap the Alaska vein is now 300 ft. down.

SISKIYOU COUNTY

*Blue Ledge*—At this copper mine, on the edge of the county near the Oregon line, from 300 to 350 men are now at work. A great amount of ore has been blocked out and a smelter will be erected during the coming year. The county supervisors have in view a project for the construction of a road from Yreka to the mine.

*Bonanza No. 2*—This property, 10 miles north of Yreka in Fool's Paradise district, between the Klamath and Shasta rivers, has been sold by Martin & Seaman to Oregon men for $15,000. A 10-stamp mill will be put up and a cyanide plant installed.

*Globe*—At this mine, Dedrick, the five-stamp mill is running steadily on good ore. Nineteen men are employed, with R. A. Shinner as superintendent.

TUOLUMNE COUNTY

*United Mines Corporation*—This company, owning the Dead Horse, Grizzly, New Albany and Lady Washington mines at Carters, is doing grading preparatory to putting up a 50-stamp mill. The Grizzly has been pumped out and re-timbering has commenced.

*Dresden*—This San Jose Company which has been at work three years on the old New York tunnel property near Jamestown has quit operations, the bond having expired.

YUBA COUNTY

*Northern Light*—Frank W. Johnson, of Marysville, has bought a half interest in this mine at Brown's valley from W. M. Jeffords. This is one of several recent mining deals in that neighborhood.

## COLORADO

LAKE COUNTY—LEADVILLE

*Tonnage*—The output for the month of October was 82,902 tons of ore of all classes. The falling off from the previous month is accounted for by the lack of cars to move the ore. For 10 days about the middle of the month the congestion was so great that several mines stopped breaking ore. The railroads claim that this is now settled and that the mine owners will from now on receive all the cars necessary to move the output.

*Dinero Tunnel*—The Dinero Consolidated Mining and Tunnel Company, Sugar Loaf district, which owns and controls the Dinero group of mines with all of the tunnel rights, is incorporated under the laws of Arizona. The capital stock is 5,000,000 shares at a par value of $1 each. The general offices of the company are at Kansas City, Mo., with the mine offices in Leadville. Dudley M. Gray is general manager. The company proposes to run a tunnel from the northeast base of Sugar Loaf, a distance of 3045 ft., to its property, 900 ft. below the surface of the Dinero mine. This is expected to cut three fissure veins 500 ft. below the old workings. The company intends to install an electric plant which will provide the necessary power for the electric drills, hoists and the most economical kind of transportation in the tunnel, and also light the tunnel and all of the lower drifts as soon as the tunnel connects with them. Upon the completion of the tunnel the company intends to erect a large concentrating mill to treat the low-grade ores. It is claimed that there are several million dollars' worth of ore on the dumps which were thrown away in early days. The company owns, leases and controls almost 100 acres of mineralized land, including the Dinero, Buckeye State, Orinoco, Dinero placer, Inez, Inez No. 1, Bull Dog, Pitcher and Michigan Boy.

*Yak Tunnel*—For several months W. W. Davis, general manager of the company, has been at work with David H. Moffat, the owner of the Resurrection, to secure a lease on the property, and during the week succeeded in having all papers signed for a very favorable lease for a number of years. Mr. Davis has also secured the right of way through the property of the Sentry Mining Company, which includes the Horace, Henry, Howard, Hugh, Herman, Ollie Reed and Stormy Petrel, all situate in South Evans and about halfway between the present breast of the Yak tunnel and the Resurrection. In addition to the lease on the Resurrection, the Yak people have secured a lease on the Fortune, adjoining the Resurrection. The result of this deal will be the driving of the great bore into the Big Evans basin, which will drain the whole section, permitting the shipping of the low-grade ore in the different mines in the district. The length of the Yak tunnel at present is close to three miles and when it is completed to the Resurrection it will be nearly five miles. It will take some time to arrange details for the driving of this big undertaking, such as sinking air-shafts, installing new machinery, etc.; but it is expected that all will be completed within six months, when driving ahead will be started.

*Chippewa*—The shaft on this property, Breece hill, has been sunk to a depth of 600 ft. and drifts are being run from the bottom of the shaft to the north and south to catch the ore-shoot.

SAN MIGUEL COUNTY

*Ore Shipments*—During the month of October, 100 carloads, or 2500 tons, of crude ore and concentrates were shipped from the Telluride station to smelters. Of these shipments it is estimated 90 per cent. consisted of concentrates which were made by the reduction of four tons and upward of crude ore into one. At $80 per ton, a conservative estimate, the 2500 tons represented $200,000. To be added to these figures is the gold saved on the

plates of the various mills by amalgamation. At Tomboy, Cimarron, Smuggler-Union, Liberty Bell, Nellie and Gold King mills much retorting is done and the values from this source exceed those from the concentrates and crude ore. The above shipments do not include those from Ophir, Sawpit, and Wilson stations, within the county, the shipping points for adjacent districts. The shipments last month show a gain of over 40 per cent. as compared with those for October last year.

SUMMIT COUNTY

The camp of Frisco is looking extremely lively, and great excitement is being caused by an enormously rich strike made on the Royal property.

*Royal*—This property on Royal mountain is being worked by a tunnel, by Hickmann & Linquist, who have found some rich float in the wash through which their tunnel is going.

*Newton*—This property, to the east of the Victoria, on the same mountain, will be worked actively from Nov. 1, under the direction of Mr. Colburn, who is in charge of the operations for his father, a Denver mining man, who owns control.

*Victoria*—This property has been taken over from the old Masontown Mining and Milling Company, by G. D. Hibbs, of Pennsylvania, and a party of friends, who intend to develop the property and work the large sulphide orebodies. J. Percy Hart is now at the mine, getting everything into shape for systematic work. The main shaft will be sunk to the depth of 200 ft., and a hoist and pump installed thereon. At the same time, a survey is being made by the consulting engineer, David H. Lawrance, for a main tunnel to be driven in at the bottom of Mt. Royal. This tunnel will be about 800 ft. long, and will cut the lode at sufficient depth to give nearly 1000 ft. of stoping ground.

*New Discovery*—About 1½ mile west of the Square Deal property, in the north Ten Mile cañon, a gold ledge has been discovered by two local miners, who have taken up a group of claims and formed a local syndicate to open up their discovery. Samples from the outcrop gave returns of $6 to $10 per ton. The nature of the ore is different from anything else surrounding it, and it appears to be the making of a free-milling gold proposition.

*Kitty Innes*—An important strike has been made on this property by the lessee, George Berry. In driving the lowest tunnel into Peak 1, he has discovered a ledge which carries 4 ft. of solid ore, the majority of which is chalcopyrite of a good grade.

## IDAHO

SHOSHONE COUNTY

*Bunker Hill & Sullivan*—This company, at Wardner, is constructing a new 400-ton mill for the treatment of its tailings, of which there is probably over a million tons, averaging 2.5 to 3 per cent. lead and 0.75 to 1.25 oz. silver per ton. The mill is near completion.

*Success Mining Company*—This company, on Nine Mile creek, is operating a new mill for the treatment of its zinc-lead ore, which is a new undertaking in the Coeur d'Alene.

*Frisco*—This company, at Gem, which for many years worked its mines for lead only, is now, after an idleness of three years, preparing to mine its zinc-lead ore and treat it by methods similar to those in use at the Success mill.

## INDIANA

CLAY COUNTY

*Hall-Zimmerman Coal Company*—This company has filed articles of incorporation with the Secretary of State. The capital stock is $12,000 and the principal office in Brazil. The company will open up coal mines. Wm. C. Hall, Sr., Wm. C. Hall, Jr., and W. P. Zimmerman directors.

PIKE COUNTY

While drilling for oil at Winslow, eight miles south of Petersburg, at a depth of 80 ft., an 8-ft. vein of coal of excellent quality was found. No coal had previously been taken in this vicinity and the find has created considerable interest. The land will be developed at once.

## KENTUCKY

CARTER COUNTY

*Kentucky Transvaal Diamond Mining Company*—A company by this name has undertaken to investigate the reported discovery of diamonds in this county.

## LOUISIANA

CAMERON PARISH

A company is being organized to develop sulphur deposits at Johnson's bayou. The property was lately bought by E. B. Mentz, of Houston, Texas.

## MICHIGAN

HOUGHTON COUNTY—COPPER

*Baltic*—It is possible that some exploratory work will be started on the Mabbs vein, which gives good surface indications. Results from the exploratory work on the Baltic lode has been disappointing. Ground has been broken for a new shaft, to be known as No. 5, which will intercept the Isle Royale amygdaloid on Section II, some distance north of No. 6. Drill explorations at that point showed a lode 27 ft. wide and well charged with copper. The new shaft will be provided with two hoisting compartments and a pipe and ladder way.

*Caldwell*—Blasting in solid rock has begun at this property, controlled by the Calumet & Hecla. At No. 1 location it was necessary to penetrate 25 ft. of overburden before reaching rock. At No. 2 sinking is still in the overburden and it will be necessary to go 50 ft. from surface before bottoming the pit on the ledge.

*Calumet & Hecla*—Preparations are under way for resuming work in No. 17 shaft on the Osceola amygdaloid lode. It is the most northerly opening on that formation on Calumet & Hecla lands, and the only shaft of that branch that has been idle lately. It is approximately 1000 ft. deep and equipped with a temporary plant.

*Centennial*—The skip roads have been laid in No. 2 shaft to the 18th level, and the tracks are being ballasted. Work has started on the erection of the Sullivan hoisting engine, the red sandstone engine-house having been completed some time ago. As soon as it goes into commission track-laying will be resumed and completed to the 27th level, to which depth the shaft is now opened to the full size of two compartments. The building for the compressor is completed and the new 60-drill compressor has arrived. It should be erected by next month, when 10 more drills will be put to work underground and rock shipments increased. The showing of rich ground in the 27th-level drift, south of No. 1, continues. Rich ground was penetrated in that drift five weeks ago. This ground is beneath a rich streak at the 26th level and undoubtedly is the same shoot. At the 30th level, drifting north is in rich ground. No. 1 shaft, sinking below the 30th level, is also in rich ground.

*Franklin*—This mine is working short-handed, but rock shipments are nearly normal. In the crosscut east from the old workings at the fourth level, which is being extended to cut the Kearsarge lode, a formation has been intercepted which may prove to be that vein. It shows slight copper values, and will be tested by drifting.

*Old Colony*—A resumption of sinking is expected. The drift which encountered a good showing of copper two months ago, at a depth of 700 ft., is still in the same grade of ground. Indications point to it being the same as that worked at the Isle Royale mine. Captain James Chynoweth, of Calumet, is superintendent.

*Osceola Consolidated*—At the North Kearsarge branch a diamond drill is still in service at the new No. 4 location, where it is proposed to start a new shaft as soon as the drill shows conclusively the position of the lode.

*Osceola Consolidated*—Captain John Rowe, formerly head mining captain at the Atlantic iron mine at Iron Belt, Wis., has succeeded Captain Hugh James, resigned, as head mining captain of the old Osceola branch.

*Tecumseh*—Sinking in No. 1 shaft was discontinued at the ninth level, where a plat is being cut. R. M. Edwards, Houghton, is superintendent.

## MINNESOTA

### IRON—VERMILLION RANGE

*Soudan*—The shaft at this mine is being sunk to a depth of 1200 ft., which will make it the deepest mine in the State. The surface equipment, which covers considerable ground, includes a power house and boiler house for the shaft hoists, engine rooms, repair shops, warehouses, etc. The compressor plant is situated at some distance from the shaft in a place where water is available, in order to operate the compressors condensing. The plant is installed in a building of brick construction 60x100 ft., and air is furnished from the compressors at 65 lb. in the mine. The machines are Allis-Chalmers duplex, cross-compound type with steam cylinders 18 and 36x48 in., and two-stage air cylinders 30 and 48x48 in. Air pumps are the standard Allis type, belt driven from the crank shaft. Each compressor has two vertical coolers. The season's shipment for the mine will be approximately 225,000 tons of ore.

## MONTANA

### BUTTE DISTRICT

According to an estimate by an official of the Amalgamated, the output of copper in the Butte district during October aggregated about 25,500,000 lb., of which 7,200,000 lb. was produced by Boston & Montana, 6,250,000 by Anaconda, 3,800,000 by North Butte, 2,500,000 by Red Metal and 1,175,000 by Original. The other companies dropped below 1,000,000 lb. each.

*Boston & Montana*—Ground has been broken for a 2000-ft. shaft on the Badger State. The company will develop this claim and the Auraria through the opening. The claims adjoin each other in an east and west line and are traversed by a vein between 50 and 100 ft. wide, in which copper ore has been found near the surface of both claims. The new engine on the Leonard is doing preliminary work, but no more has yet been hoisted through the new four-compartment shaft. Eight locomotive boilers, having a capacity of 250-h.p. each, will supply power for operations through this shaft. Three air compressors will be operated, one of which is running. The company mined about 106,000 tons of ore last month.

*Anaconda*—Mining has been resumed in the Neversweat, one of this company's large ore producers. Operations were suspended about Oct. 15 on account of a broken engine shaft, the result of settling ground beneath the foundation of the machinery. The output of the entire property was not materially curtailed by the suspension, for the men were transferred to other workings and production increased there to make up the deficiency. During October the company mined about 118,000 tons of ore.

*North Butte*—Drifting east and west on the vein of the Edith May and Miners' Union, and also the Jessie, continues without apparent diminution of the shoots. The shaft has been deepened an additional 100 ft. and is going another 100, which will give a total of 1800 ft. The veins will be opened from the bottom. Crosscutting from the 1200 and 1600 of the Jessie toward the Berlin veins continues, but the company does not expect to finish the work until next year.

*Red Metal*—Development of orebodies in the Cora, Rarus and Minnie Healey continues. The company is producing between 1200 and 1300 tons a day, most of which comes from the Rarus. The Cora is in better shape than it has been since it was bought from United Copper, bodies of good ore not known to exist in it having been opened on the 1400, 1500 and 1600 levels recently. Sinking is in progress and 400 ft. will be added to the shaft, making it 2400 ft. deep.

*Davis-Daly*—The crosscut going south from the 1800-ft. station of the Original under contract is 872 ft. long and will have to be driven about 200 ft. more before it catches the vein of the Thomas. Sinking is going on in the Colorado, Silver King and Mount Moriah shafts. A stringer of copper ore 3 ft. wide has been cut at a depth of 533 ft. in the Colorado. The shaft on the Smokehouse is not yet drained.

## NEVADA

### ESMERALDA COUNTY

*Mohawk Jumbo Consolidated*—It is reported that this company is to be formed by the consolidation of the Mohawk, the Jumbo, the Red Top and the Laguna companies. The capital will be $50,000,000, in 5,000,000 shares of the par value of $10 each. It is stated that 500,000 shares will be exchanged for 1,000,000 shares of the Jumbo Mining Company, 500,000 for 1,000,000 shares of the Red Top, 2,000,000 for 1,000,000, shares of the Mohawk, and 200,000 for 1,00,000 shares of Laguna. These exchanges involve the issue of 3,200,000 shares of the new consolidated company, leaving 1,800,000 shares in the treasury. The president will be George Winfield, and R. L. Colburn, John S. Cook, D. Finch, W. J. Hughey will constitute the Board of Directors.

### NYE COUNTY—TONOPAH

*Ore Shipments*—Shipments over the Tonopah railroad for the week ending Nov. 1 were: From Tonopah, 2480 tons; Goldfield, 2150; Lone Mountain, 60; total, 4690 tons. Shipments from Tonopah in detail were: Tonopah Company, 1450; Tonopah Extension, 480; Belmont, 450; Midway, 100 tons.

*California*—The superintendent of the California-Tonopah mine reports a new strike 4 ft. in width, encountered in the north crosscut on the 150-ft. level. The vein is quartz, carrying a large amount of silver. The vein is distinct from any other orebody hitherto found in the mine, and the ore has a different appearance from any elsewhere found in Tonopah. Further developments will be watched with interest; as there is a possibility of the find opening up a large amount of promising ground in the southeast portion of Tonopah.

*Midway Mill*—The alterations and additions have been completed, and 20 stamps are now dropping on Mizpah dump ore. The plant is now making a good extraction, and is running smoothly.

*Montana-Tonopah*—Preparations for the new mill are now being made. Tenders have been let for the erection of buildings, and the work will be pushed on as quickly as possible, so as to minimize delays through bad weather during winter. Developments in the mine are satisfactory.

*Tonopah-Extension*—The new ore-shoot recently cut in the extreme western end of this mine is the richest yet found, and gives promise of being very extensive. Several of the directors have visited the mine recently, and each is enthusiastic over the company's prospects.

*Standard*—The workings are making a large amount of water, which is impeding development operations. A strong pump has been ordered from San Francisco to enable the shaft to be sunk from the 600-ft. to the 800-ft. level.

### NYE COUNTY—SILVER PEAK

*Pittsburg-Silver Peak*—The ground is being broken to receive the foundations for the new 100-stamp mill which the contractors expect to have running in June next. The Tonopah-Silver Peak Railroad is approaching completion, and freight is now being hauled over a considerable portion of it.

*Great Gulch*—This property is being developed by local capitalists and gives promise of becoming valuable. Several claims adjoining the northern boundary of this mine have been acquired recently by the Nevada Smelting and Mines Corporation, and Donald B. Gillies, the general manager, is now preparing to commence development work. There is a scarcity of miners in this district.

### NYE COUNTY—DULUTH

*July Mine*—Some very rich ore is being raised from the main vein at a shallow depth, and the prospects of several of the adjoining claims are promising. A large amount of Cripple Creek capital is being invested in the claims and a new townsite is being laid out. The field is about 95 miles northwest of Tonopah and eight miles north of the old Ellsworth goldfield on the Paradise range. The first strike was made last July, when the prospectors were doing assessment work. Rich ore was cut in several places on the outcrop. The owners then decided to lease blocks for a period of a year. Several of the lessees are now shipping ore and the good

prospects of the mines have led to a large number of applications for new leases.

NYE COUNTY—BULLFROG

*Shoshone Consolidated*—The Traylor Engineering Company, New York, has secured the contract for the new mill, and preparations are now being made to put in the foundations. The mill will have a capacity of 300 tons per day and will be completed in March next. The company has about 7000 tons of ore in the dump, estimated to assay over $100 per ton. It will be shipped to Salt Lake as soon as the railroad reaches Bullfrog. Good progress is now being made with tracklaying and trains will be running into this camp from Tonopah within a month. The main shaft has reached a depth of 400 ft. and the ore at this depth is in all respects similar to that found in the upper levels.

WASHOE COUNTY

*Keystone-Nevada*—Development on this property, at Olinghouse, has shown orebodies of considerable size, and the superintendent, Jesse K. Lloyd, is preparing plants for a 20-stamp mill. C. L. Dignowity, of Reno, is preparing an elaborate report on the property.

## NEW JERSEY

MORRIS COUNTY

*Teabo*—The new shaft on this old property is now down 760 ft. A remarkable point is that there is hardly any water in the shaft, though most mines in the district are wet.

## NORTH CAROLINA

PERSON COUNTY

*Durgy*—The old Yancy, now called the Durgy mine, at the south end of the Vergilina copper belt, is being exploited by the Person Consolidated & Gold Mines Company, under Superindent Clice. Stoping is proceeding on the 400-ft. level, where the vein is between 8 and 12 ft. wide. A modern concentrating mill has just been put into operation, and daily shipments of concentrates are now made. This is the only mine in the belt to show any present activity.

## OREGON

BAKER COUNTY

*Eagle Valley Power Company*—Work is in progress at this company's electric plant on Eagle river, 30 miles east of Baker city. It will furnish power to the Sanger and the Virtue mines.

*Nelson*—Plans have been made for a large portland-cement plant at Durkee on the Oregon Railway and Navigation main line. The plant is owned by Frank Nelson, who now has a lime kiln at Durkee. It will be run by electric power.

*Oregon Lime and Plaster Company*—This company, which owns lime kilns near Huntington, will move its plant to a point three miles distant, on Snake river, where large works will be built, to be run by electric power.

## PENNSYLVANIA

ANTHRACITE COAL

*Philadelphia & Reading Coal and Iron Company*—This company's statement for September and the three months of its fiscal year from July 1 to Sept. 30 is as follows:

| | September. | Three Mos. |
|---|---|---|
| Earnings | $2,150,451 | $6,538,669 |
| Expenses | 2,219,776 | 6,478,074 |
| Net, or deficit | Def. $69,325 | Net. $60,595 |

For the three months there was a decrease of $152,811 in earnings; an increase of $31,091 in expenses, and a resulting decrease of $183,902 in net earnings.

*Stoddard Coal Company*—Three boilers owned by this company at its washery in the Wold Creek valley, near Minersville, were destroyed by a fire in the boiler-house. The company owns a number of washeries in the anthracite region.

*Philadelphia & Reading*—In line with its policy of coal development in the Schuylkill territory, this company has arranged for six new openings. At the Otto colliery, near Branchdale, west of Pottsville, a five-compartment shaft 1400 ft. deep is to be sunk at once. At the John Veith operation in Heckscherville valley there have just been completed two new 1300-ft. shafts.

*Silver Brook Coal Company*—It is stated that the Lehigh Valley Coal Company will take control of this company's mines, which have been abandoned by the owners as unprofitable. The latter company has surrendered a tract of 553 acres of coal land to the Lehigh company.

*Elsworth Colliery*—A new breaker is being erected at the Elsworth colliery, Broad mountain, Schuylkill county, in which concrete walls have been provided for the breaker and the coal pockets. Between them there is also a concrete floo to avoid droppings of slush and dirt.

*Delaware Lackawanna & Western*—Fire broke out one day this week in the Gaylord mine of this company, near Plymouth. It was discovered in the 7-ft. vein. A large force of fire fighters extinguished it in a few hours.

*St. Clair Coal Company*—The James McGraw Company has completed its stripping contract for this company at St. Clair, and is shipping its machinery to New Jersey, where it has taken another large contract. A drift is now being cut into the solid coal, and from this gangways are driven to take the mineral away. Three trips of fourteen cars, containing about four tons of coal each, are now being made daily.

## SOUTH DAKOTA

CUSTER COUNTY

*Ideal*—Arrangements are being made to install air compressors and other machinery necessary to run the tunnel farther into the hill. Indications are sufficiently good for continuing the work.

*Wisconsin Mica Company*—This company has just purchased one-half interest in the Iron Creek No. 1 lode claim. Consideration, $2200. There is great interest in mica prospects.

LAWRENCE COUNTY

*Golden Reward*—A new building 18x30 ft. has been completed for the assay office. It has two muffles and can melt 30 assays at one time. The samples will go through a small Gates crusher and then through a Braun disk pulverizer.

*Dividend*—The out-of-door 30-ton cyanide plant for treating the ore on this dump, which has just been leased, is now completed. About 2000 tons of ore on the dump will be treated, averaging over $4 a ton, and as soon as the cold weather sets in, men will be put to work breaking the ore in the mine.

*Eleventh Hour*—At a meeting of the directors of this company held in Chicago, Oct. 16, it was decided to execute a first mortgage on the property to the Black Hills Trust and Savings Bank, which is to act as trustee for the bonds to secure the issue. The creditors will receive $21,342 in bonds and the balance of the indebtedness, $7570, in cash.

PENNINGTON COUNTY

*Golden West*—This property is now shut down until next spring, when the mill will be enlarged. As the plant is run by water power, it cannot be operated successfully during the winter. During the past season, nearly 5000 tons of ore were milled. The mine has made a record for the treatment of low-grade ores at small cost. The open-cut method of mining has been largely used; ore is transported from the mine to the water-power mill by an aërial tramway. Before next season opens, the Chilean mill now in use will be discarded, and stamps and slow-speed Lane mills will be installed.

*Cumberland*—Five of the ten stamps in this mill are now dropping and the others will be in use in a short time. The workings have been cleared of water, and are being rapidly put in shape for steady production. This property is best known as the old J. R.

## TENNESSEE

HART COUNTY

*Hart County Oil and Mining Company*—This company has contracted to furnish a Chicago concern with a large quantity of kaolin from its property near Bonnieville.

## UTAH

BEAVER COUNTY

*Talisman*—A body of lead-silver ore has been encountered in this property at 235 ft. depth.

*Cedar*—This company is shipping high-grade silver-lead ore.

*Frisco Contact*—Developments in this

property are reaching an interesting stage. The management is driving for an extension of the Horn Silver vein.

JUAB COUNTY

*Tintic*—Ore shipments amounted last week to 136 carloads, the shipping mines and amounts being: Centennial Eureka, 42; Beck Tunnel, 5; Bullion Beck, 4; Ajax, 4; Carisa, 4; Eagle & Blue Bell, 9; Eureka Hill, 7; Gemini, 11; Grand Central, 6; Mammoth, 18; Swansea, 3; Scranton, 3; Dragon Iron, 7; Uncle Sam, 3; Yankee Consolidated, 4; Victoria, 4 cars.

*Carisa*—This company marketed ore during the past week which netted about $70 a ton.

SALT LAKE COUNTY

*Consolidated Flagstaff*—This company has made another payment of $20,000 on the purchase price of its property at Alta. Embraced in this territory is the old Flagstaff mine operated in the early days of the district.

TOOELE COUNTY

*New Stockton*—The manager of this company, J. J. Trenam, of Salt Lake, has announced that the shaft is to be sunk below the 1000-ft. level, on which some extensive bodies of ore have been opened. Ore shipments are being made regularly. An aërial tramway will likely be put in next year.

## VIRGINIA

AUGUSTA COUNTY

*Crimora Manganese Company*—Operations at this company's manganese mine at Crimora were suspended Oct. 15, and will not be resumed before February, pending change of management. A rock drainage tunnel, 5800 ft. long, has recently been completed, connecting with a shaft at the center of the open workings, and hereafter the clay banks, carrying nodules of manganese oxides, will be washed by hydraulic methods. A steam shovel is used to remove the gravel overburden.

CHESTERFIELD COUNTY

*James River Coal Corporation*—This company, of Richmond, which has been reopening some of the old coal mines south of Midlothian, has recently completed an inclined shaft to the coal, and will soon have some of the old workings in good order. Track is being laid to the mine along the old roadbed, formerly deserted, to connect with the Southern Railway, and a modern tipple is under erection. The mine will begin shipments in a few months.

## WASHINGTON

STEVENS COUNTY

*First Thought*—A contract has been made with the Northport smelter to deliver 1500 tons of ore per month as soon as the smelter starts up.

*Last Chance*—The Jupiter Lead Company is shipping two carloads of lead ore a week. The mine is near Northport.

*Mammoth Silver-Lead Mining and Smelting Company*—A tunnel from above the Coeur d'Alene river bank has broken into a body of lead ore 90 ft. below the surface.

*United Copper Mining Company*—The shaft, down 120 ft., will be continued down to the 200-ft. level at which depth it will be connected with a tunnel 600 ft. in length, which has recently been started. The shaft is being enlarged from a single- to a two-compartment, and a steam hoist, good for 400 ft., is being installed. Steam drills will be used, and two shifts will be employed in the shaft and tunnel during the winter. The orebody has been crosscut from the bottom of the shaft, and found about 25 ft. wide. The ore carries copper. The property is situated near Chewelah.

*Panhandle Smelting Company*—This Idaho company is reported to have purchased the tungsten ore dumps of the Providence, Silver Seal, Queen and Deertrail mines in the Cedar cañon district, and is assorting the ore for shipment to its smelter.

## WISCONSIN

ZINC DISTRICT

*DeLestry Development Syndicate*—Edmond L. DeLestry, of St. Paul, Minn., is fostering a novel scheme in connection with the development of some 400 acres of mining land about five miles west of Platteville. Associates with him are 100 St. Paul men, who agree to pay into the treasury $10 per month each for 24 months, the money all going toward development and permanent installation. As soon as the ground is proven worthy of a mill, and the same is on a paying basis, it is the intention to incorporate and take up another proposition on the original basis. Work on a portion of the DeLestry property has been going on quietly for nearly six months, and it has just been announced that in a series of 15 holes ore was found in all but one. Arrangements have been made for the immediate installation of a complete sinking outfit, consisting of gasolene engine, Cornish pump and hoist.

*O. P. David Mining Company*—A contract has been let to the Galena Iron Works Company for a 50-ton concentrating plant of the one-jig, eight-cell type, as generally used throughout the district, and a 10-in. Cornish pump to be erected at this mine, near Montfort. The power is to be steam, generated by two 80-h.p. tubular boilers. A 14x36-in. Corliss engine will drive the mill, pump, air compressor and a 7½-k.w. generator. A 20-h.p. double-cylinder geared hoist will be set in the derrick, thus enabling the hoister-man to dump the tubs into a large hopper by means of a swinging dump, without leaving his post.

## WEST VIRGINIA

RALEIGH COUNTY

*New Flat Top Mining Company*—This company has been incorporated to open and develop a large tract of coal land, the sale of which was recently noted. The property is so situated that connections can be made with the Deepwater & Tidewater, the Chesapeake & Ohio and the Louisville & Nashville railroads. Incorporators of the company are Messrs. O. C. Nelson, H. B. Corner, J. R. Nutt, E. V. Hale and H. D. Messick, all of Cleveland.

# Foreign Mining News

## CANADA

ONTARIO—COBALT

The first official statement of shipments from the Cobalt district over the Timiskaming & Northern Ontario Railway has just been published. The shipments for the month of October were 1120 tons of ore. The Nipissing Mines Company was the largest shipper.

*Foster*—One vein has been blocked out for 120 ft. Another vein has been stripped for 750 ft., showing an average width of 8 in. Superintendent Scott is in Toronto buying machinery, and engaging men.

*Silver Queen*—At the 65-ft. level, drifting has been carried on for 100 ft., yielding ore high in value. An air receiver has been installed on this level, so that drills can be kept continuously in operation. At the power-house two 60-h.p. boilers, an air compressor, hoisting plant and dynamos have been installed. A second shaft is being sunk. The main shaft is approaching the 100-ft. level, and as soon as that is reached, extensive drifting will be undertaken.

*Tretheway*—G. W. Tretheway has disposed of his controlling interest in the Tretheway Silver-Cobalt Company, and in the Coniagnus Mining Company, which owns the adjacent property known as J. B. C., to an American syndicate, the members of which are unknown. The price is stated at $600,000, but this may be merely conjectural. Two other parties with whom Mr. Tretheway had been in negotiation for the purchase of his shares in the Tretheway company, claimed that he had agreed to sell to them, and took out injunctions to restrain him from disposing of the shares; but these proceedings were futile, as the transactions had been fully completed.

*Net Lake*—On the molybdenite property of Harry Dreany, near Net Lake, in the Temagami reserve, 20 veins have been found, the ore carrying gold values running from $3 to $30 per ton, sufficient to pay working expenses.

*Beaver Cobalt*—J. H. Jewell, of Toronto, has purchased a controlling interest in this company, the price being in the neighborhood of $200,000. Mr. Jewell is one of the directors of the Erie Cobalt Mining Company.

*Colonial Silver Mines, Ltd.*—This company has been organized by the syndicate

represented by McCormick Brothers, of New York, which recently purchased the McLeod-Glendinning mine, Cobalt, and is acquiring other properties in the same field. Anson D. Cartwright has been appointed superintendent and a complete plant, including a 300-h.p. air compressor, has been ordered. In sinking the shaft a vein 4 ft. wide was struck, having a streak of silver 5 in. wide in the middle, at a depth of 5 ft. The ore is claimed to run 5000 oz. of silver per ton. This vein is believed to be a continuation of another vein found shortly before at a distance of 300 ft. from the shaft. The force of 20 men now at work will shortly be increased.

*Cleveland Cobalt*—This company, recently chartered with $1,000,000 capital, in which S. W. Parsons, Frank M. Cook and Mr. Tobey, of Cleveland, O., are interested, has secured the properties of the Hudson Bay Extended, the Clear Lake Mining Company and the Clear Lake Syndicate and will proceed to operate them. An excellent vein has been discovered on the portion of the Clear Lake Mining Company's location beneath the lake as the result of diamond drilling. It can be traced and developed from the shore.

*Cobalt & Abitibi*—This company is operating a property near Gillies depot with steam machinery and a force of 30 men. They have struck three parallel veins of pink calcite and some native silver—and are locating several claims north of the present holding.

*Evans*—At this property, Portage bay area near Cobalt, development work has resulted in the discovery of a smaltite vein and the tracing for several hundred feet of veins carrying silver and cobalt. Surface indications in the portion of the Cobalt field adjoining the Montreal river are not so rich as elsewhere, and it will require more development work to put mines on a paying basis than in the central area.

*Gillies Timber Limit*—Development work is being actively carried on under the direction of Prof. W. G. Miller. The 75-ft. shaft is now down 30 ft. and is expected to be completed by Dec. 1. Trenching is being extensively undertaken resulting in the discovery of a number of silver-bearing veins which promise well.

*Godfrey*—At this location near Gillies depot, Coleman township, a Montreal syndicate, including A. G. Fowler, Ross and Robert Mullen, has secured the property from which in the spring some fine ore was taken. It has since been in litigation. The same purchasers have secured the Powell lot, adjoining the White-Hargrave location, paying for the latter $60,000. John Black will have charge of the development of these properties.

*Green-Meehan*—A syndicate of Toronto, Ottawa and New York capitalists, one of whom is W. Y. Soper, of Ottawa, has purchased this property in Bucke township, two miles north of Cobalt, for $250,000. It has a vein 5 ft. in width. Charles O'Connell, an experienced California miner, has been appointed superintendent. He has a staff of 25 men under him. Buildings are being rapidly put up to enable work to be continued through the winter. Nine veins have been exposed. It is hoped to have a complete plant installed this year.

*Huronian Cobalt*—The property of this company is in the southwestern section of the Cobalt area. A force of men is busy stripping, in order to expose surface veins and work has been begun on a 50-ft. shaft. Superintendent J. J. Anderson is in charge of operations.

*La Rose Mine, Cobalt*—An immense nugget, 5 ft. long, 2½ ft. wide, and 14 in. thick, has been taken from the 300-ft. level. It is seamed with native silver and weighs about 3500 lb. A large accumulation of refuse ore on the dump has been sold by the company at $25 per ton. It will be forwarded by the purchasers to Providence, R. I., for treatment.

*Montreal Smelting and Reduction Company*—At Trout Mills, near North bay, Ont., the building construction is completed and machinery is now being received for installation. It is expected that the smelter will be ready for business in the course of three or four months.

*Nancy Helen*—W. R. Smyth has been elected president and Wm. Black, secretary-treasurer of the company, which has property in the town of Cobalt adjoining the Buffalo mine. There is a 60-ft. shaft and two carloads of rich ore awaitng shipment.

*Nipissing Mine, Cobalt*—Large shipments are being made. The shipments for September amounted to about $250,000, and those for October will aggregate double that value. Eighty men are now at work on Ledge 49, on the bonanza vein, stripping and taking out ore. Numbers of visitors to the camp desire to inspect the vein, but in order to do so, permission is required to be obtained from the New York office. The Allis-Chalmers Company is installing a mechanical sampler by means of which it will be possible to ascertain the exact value of the ore shipped. It is the first to be introduced in Cobalt.

*Red Rock*—A Toronto syndicate, represented by A. E. Osler, has purchased this property at Cobalt. They were offered by the sellers $30,000 to release them from their contract to sell, but refused. They have a quantity of ore ready to ship.

#### QUEBEC

Renewed interest in the Chibogamoo mineral region of northwestern Quebec has been aroused by the return to Quebec of several prospectors with extraordinarily rich specimens of ore. Charles Ralph, representing the Montreal & Lake St. John syndicate, obtained specimens of silver ore assaying $2800 to the ton and promising specimens of copper and gold ore. A party of prospectors in the interest of a Quebec syndicate, under the leadership of Mr. Blake, came back with rich specimens of copper, asbestos and magnetic iron ore, the latter being particularly good. These are all being analyzed. A New York syndicate is negotiating with the Quebec people for an interest, but the latter have declined to make any terms until further development work has enabled them to judge better of the value of the property. Samples of copper, silver and cobalt bloom secured by Armand Gessier have been sent to be assayed. A number of locations have been secured by returning prospectors at the Department of Mines, Quebec.

## AFRICA

#### TRANSVAAL

The October production of the Transvaal mines is reported at 540,609 oz. fine gold, which is 35,498 oz. more than in September, and 125,082 oz. more than in October, 1905. For the 10 months ending Oct. 31, the total was 4,040,870 oz. in 1905, and 4,703,077 oz. in 1906; an increase of 662,207 oz., or 16.4 per cent. this year.

## EUROPE

#### SPAIN

Exports of minerals from Spain for the eight months ending Aug. 31 are reported by the *Revista Minera* as below, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Iron ore | 5,449,859 | 6,668,818 | I. 1,218,959 |
| Copper ore | 698,199 | 750,334 | I. 52,136 |
| Zinc ore | 92,579 | 99,091 | I. 6,512 |
| Lead ore | 4.315 | 3,165 | D. 1,150 |
| Manganese ore | 34,240 | 65,825 | I. 31,585 |
| Pyrites | 463,524 | 716,624 | I. 253,100 |
| Salt | 273,869 | 336,241 | I. 62,372 |

The increases in iron ore, copper ore and pyrites were large. Exports of metals for the eight months were, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Pig iron | 36,468 | 21,873 | D. 14,595 |
| Manufactured iron | 3,367 | 16,498 | I. 3,131 |
| Copper | 5 723 | 6,515 | I. 792 |
| Copper precipitate | 11,265 | 15,076 | I. 3,811 |
| Zinc | 1,135 | 694 | D. 441 |
| Lead | 114,637 | 119,017 | I. 4,380 |

Imports of chemicals this year were 8814 tons borates and silicates; 10,355 tons potash and soda salts; 2157 tons soda sulphate; 22,611 tons phosphates; 134,064 tons mineral fertilizers.

## SOUTH AMERICA

#### DUTCH GUIANA

The official report of gold production for the eight months ending Aug. 31 was as follows, by districts: Surinam, 260,414 grams; Saramacca, 182,758; Marowijne, 159,505; Lawa, 148,313; Corantjin, 19; total, 751,009 grams, or $499,137 in value.

#### BOLIVIA

Exports of tin concentrates and metallic tin from Bolivia for the six months ending June 30, are reported at 15,954 metric tons.

## Coal Trade Review

NEW YORK, Nov. 14

The coal trade in the West still continues largely dependent on transportation conditions. As cold weather approaches, and the demand for steam coal continues active, as it has been for some months past, a certain degree of scarcity is beginning to be felt at the chief consuming centers, with a general stiffening of prices. In one way the car shortage has been of benefit to the trade. If there had been no delays in transportation, and the mines had been able to make full outputs, there is no doubt that most markets would have been overstocked to a degree never before known in the trade; and that cutting of prices would have followed as a matter of course.

Notwithstanding all the complaints about shortage in the Lake trade, a large quantity of coal has gone up to the Northwest. The Sault canal report shows this season, up to Nov. 1, a total of 7,318,856 tons of coal bound to Lake Superior ports; an increase of 1,719,743 tons, or 30.7 per cent., over last year. This does not include the shipments to Chicago, Milwaukee and other points on Lake Michigan.

In the East the trade has been quiet, with no special incident. Anthracite trade is improving slightly with the approach of winter, though the weather has continued unusually mild. Steam coal is still in strong demand.

COAL TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Nov. 3 were as follows, in short tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Anthracite | 3,823,486 | 3,706,088 | D. 117,398 |
| Bituminous | 24,975,466 | 26,884,439 | I. 1,908,973 |
| Coke | 9,343,063 | 10,638,953 | I. 1,295,890 |
| Total | 38,142,015 | 41,229,480 | I. 3,087,465 |

Shipments of anthracite coal from Buffalo for the year to Nov. 1 were 2,122,635 tons, of which 86,665 tons were direct to Canadian ports. The larger shipments were to Chicago, 678,300 tons; Milwaukee, 594,505 tons; Duluth and Superior, 638,525 tons.

Shipments and receipts of coal at all Lake ports for the year to Sept. 30 are reported by the Bureau of Statistics as below, in net tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Shipments | 10,573,713 | 12,643,584 | I. 2,069,871 |
| Receipts | 9,283,754 | 10,977,611 | I. 1,693,857 |

The excess of shipments over receipts is accounted for by coal shipped to Canadian ports; and by coal taken for use of steamships.

Coal receipts at St. Louis for the nine months ending Sept. 30 were 4,167,025 short tons in 1905, and 5,320,990 tons in 1906; an increase of 1,153,965 tons.

Coal shipments by water from the chief Atlantic ports for the nine months ending Sept. 30 are given by the Bureau of Statistics as below:

| | Anthracite. | Bituminous. | Total. |
|---|---|---|---|
| New York | 9,864,671 | 7,518,122 | 17,382,793 |
| Philadelphia | 1,276,354 | 2,877,224 | 4,153,578 |
| Baltimore | 161,710 | 2,389,728 | 2,551,438 |
| Newport News | ..... | 2,191,932 | 2,191,932 |
| Norfolk | ..... | 1,719,861 | 1,719,861 |
| Total | 11,302,735 | 16,696,867 | 27,999,602 |
| Total, 1905 | 12,529,315 | 15,349,519 | 27,878,834 |

New York includes all the New York harbor shipping points.

Coal tonnage originating on the lines in the Ohio Coal Traffic Association for the nine months ending Sept. 30 was as follows, in short tons:

| | 1905. | 1906. |
|---|---|---|
| Hocking Valley | 2,595,049 | 2,865,877 |
| Toledo & Ohio Central | 1,121,610 | 1,296,425 |
| Baltimore & Ohio | 1,480,870 | 1,362,758 |
| Wheeling & Lake Erie | 1,907,124 | 1,544,418 |
| Cleveland, Lorain & Wheeling | 1,504,220 | 1,491,192 |
| Zanesville & Western | 690,511 | 837,088 |
| Toledo Division, Penna. Co. | 1,319,906 | 1,651,072 |
| Lake Erie, Alliance & Wh'ling. | 551,433 | 514,067 |
| Marietta, Col. & Cleve | ..... | 8,645 |
| Total, net tons | 11,170,723 | 11,571,542 |

There was an increase of 400,819 tons, or 3.6 per cent., this year.

Coal and coke shipments over the Norfolk & Western Railway for the nine months ending Sept. 30 were, in short tons:

| | Coal. | Coke. | Total. |
|---|---|---|---|
| Line points | 6,141,620 | 1,559,159 | 7,700,779 |
| Tidewater | 2,444,144 | 124,034 | 2,568,178 |
| Total | 8,585,764 | 1,683,193 | 10,268,957 |
| Total, 1905 | 7,664,804 | 1,804,550 | 9,469,354 |

The total increase was 799,603 tons, or 8.4 per cent. Of the total traffic this year 25 per cent. was delivered to tidewater.

Receipts of coal and coke at Chicago, with shipments from that city to tributary points, are reported by the Chicago Bureau of Coal Statistics as below, for the nine months ending Sept. 30:

| | Received. | Shipped. | Balance. |
|---|---|---|---|
| Anthracite | 985,841 | 401,475 | 584,366 |
| Bituminous | 7,578,704 | 1,971,738 | 5,606,966 |
| Coke | 273,528 | 199,102 | 74,426 |
| Total | 8,838,073 | 2,572,315 | 6,265,758 |
| Total, 1905 | 7,792,750 | 2,123,583 | 5,669,167 |

The bituminous receipts were made up this year as follows: Pennsylvania, 633,556 tons; Ohio, 621,348; West Virginia, 669,711; Indiana, 2,144,073; Illinois, 3,510,016 tons.

### New York Nov. 14

ANTHRACITE

The strength which has existed in the hard-coal markets remains unabated, but conditions are not as good as could be desired on account of the shortage of cars on all roads, leading from the anthracite fields. The mines are obliged to curtail their production and hence the miner is able to earn less money. The demand for coal is brisk, but under present conditions this market is not receiving anywhere near as much as it could take care of. Prices remain unchanged at $4.75 for broken and $5 for egg, stove and chestnut; for steam sizes, $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; and $1.30@1.35 for barley, all f.o.b. New York harbor shipping points.

The Calumet dock of the Lehigh Valley Coal Company, at South Chicago, was burned out on Saturday morning, Nov. 10. No accurate estimate can be made of the loss, but it is thought that it will not be less than $700,000. The company's engineers entered the buildings Wednesday night to ascertain the damage to the property.

BITUMINOUS

The Atlantic Seaboard soft-coal trade is showing considerable strength; the demand is well up, but the car supply is very deficient. This is putting prices up on all grades of coal, and the question with the trade at present is one of transportation both by rail and water. All producers are curtailing their production on account of the lack of cars and some are not receiving more than 25 per cent. of their needs. The short supply of coastwise vessels caused by the heavy winds forcing them to accumulate in the East has produced a scarcity of craft to receive the coal coming to tide; accordingly freight rates have advanced to all coastwise points. There is some scarcity of labor noted among the soft-coal producers. This is caused to some extent by the short car supply, which does not give the miners at some mines enough work to keep them at the mine in question.

Transportation from mines to tide is irregular, in some instances taking double the usual time to complete the schedule. Trade in the far East is calling for considerable coal. This is being held back by shortage in vessel supply. Trade along the Sound is actively calling for coal. This territory is also held up at present by vessel shortage.

New York harbor trade is showing a much better tone and prices are advancing; good grades are quoted at $2.80@2.70 f.o.b. New York harbor shipping ports, and lower grades at $2.50@2.40. All-rail trade is active, and consumers of this class of business are getting in a little winter stock.

Current rates of freight seem to be 90c. and discharge from the lower ports to Boston, Salem, and Portland, and 70@75c. to the Sound, for large vessels.

### Birmingham Nov. 12

Inquiry among the coal operators in Alabama elicits the information that the only trouble is in the transportation facilities, car shortage holding down the production. There is demand for every ton of coal that can be mined. On the railroads not troubled with a car shortage, the locomotive power is limited.

Almost all of the railroads in this section have been receiving additional equipment to meet the increased business. The Birmingham Southern, belonging to the Tennessee Coal, Iron and Railroad Company, handling the raw material and fin-

ished products from one plant to another, has ordered 75 steel cars. It is understood that this is but part of equipment contracted for. Price of coal inclines upward, though no changes have been announced lately.

### Chicago Nov. 12

General conditions in the wholesale coal market are improving steadily. Notwithstanding the mild weather of the last week, sales have been large, of bituminous and anthracite, and would have been larger but for the car shortage. Prices are firm on everything except fine coals from Illinois and Indiana mines, which are as usual weakening with the approach of the winter season.

Illinois and Indiana mines are kept from crowding the city market by lack of cars and the strong demand for their products throughout the Middle West. There is little demurrage coal in the market except screenings. Lump and egg bring $2.20@3; run-of-mine $1.85@2.25 and screenings $1@1.60. Brazil lump is in good demand at $3.20@3.30.

Smokeless coals continue to be in short supply, due to lack of cars, and in strong demand. Prepared sizes especially are scarce. New River and Pocahontas lump and egg hold up firmly to $4.30 and run-of-mine to $3.40. West Virginia splint coals are firm in price and the demand is increasing.

Hocking Valley coal continues to hold up to the high prices of $3.30 for run-of-mine and $3.65 for lump. The demand is strong and the supply inadequate. Gas coals are strong; Youghiogheny is quoted at $3.55@3.65.

Anthracite is in good demand locally and over the Northwest, with chestnut still scarce.

### Indianapolis Nov. 13

Several Indiana districts report this month the largest pay-days for many months, exceeding the April disbursements, although those came just after the mines had been worked to their fullest capacity, in expectation of a strike. It is expected that the next pay-days will be even larger, as a number of new mines have been opened and plenty of work is assured. The car supply has improved, the demand for coal is great and the price has advanced.

In the district around Terre Haute the price of coal at the mines has been advanced 25c. a ton. The operators say that it is the operation of the law of supply and demand and is due to the car shortage. The operators south of Terre Haute, with their output now perhaps two-thirds of capacity, have suffered severely from the shortage in the last two weeks until at some mines not more than two days a week have they been able to hoist coal. The operators charge that the railroads are discriminating and the matter will be referred to the State Railway Commission.

### Cleveland Nov. 13

Car shortage is still the dominant factor in the lake coal trade. The railroads have been trying to relieve the situation here, but have found it impossible to do so, and as a result lake shippers have come out flatly with the statement that they are not going to be able to fulfil their contracts with northwestern consignees before the close of the season of navigation. Their only hope is to be able to complete shipments by all-rail routes during the winter. Vessel owners have been sending boats up the lakes with only part cargoes, while the smaller boats get the preference at the docks.

The domestic-coal situation has been regulated also by the car situation. Mine-run steam coal has been selling on the basis of $1.50 a ton at mines for Ohio, and $1.25 at mines for Pennsylvania. The lessening of the production of lake three-quarter coal has also had the effect of cutting down the amount of slack produced. Pennsylvania slack is, therefore, selling at $1 a ton at mine, and Ohio slack at $1.25 at mine.

The coke situation is especially acute at the present time, being tighter for future delivery than for immediate shipment. The car situation is a factor to a certain extent, but the enormous consumption has also a good deal to do with the prices. The best grades of 72-hour foundry coke are selling at $4 for spot shipment and $4.25 for future delivery; furnace coke is selling at $3.35@3.50 at the oven, both for spot shipment and on contract.

### Pittsburg Nov. 13

*Coal*—The operation of the railroad coal mines in the Pittsburg district has not improved, owing to the continued scarcity of railroad cars. Not more than 60 per cent. of the capacity of the mines is running. As a result of the scarcity and the heavy demand, prices have been advanced and the new rates quoted today are as follows: Mine run, $1.65; ¾ in., $1.75; 1¼ in., $1.85; 2 in., $2; nut, $1.30@1.40; nut and slack, $1.25; slack, $1@1.10, all f.o.b. mine. These prices are shaded somewhat on desirable orders and for small tonnages for prompt shipment an advance over the rates quoted is asked.

*Connellsville Coke*—There is but little change in the coke situation. Production and shipments are about the same, but prices of furnace coke are a trifle higher. It is almost impossible to get any grade of coke for early delivery. Furnace coke for this year is quoted at $3.10 to $3.25 and foundry at $3.85 to $4. The production in the Connellsville region, according to the *Courier*, amounted to 281,528 tons and the shipments to 14,766 cars, distributed as follows: To Pittsburg, 4804 cars; to points west of Pittsburg, 8643 cars; to points east of Connellsville, 1319 cars. The production in the lower Connellsville region amounted to 113,902 tons.

## Foreign Coal Trade

Nov. 7

Imports of fuel into Belgium for the nine months ended Sept. 30 were, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Coal | 3,002,028 | 3,925,145 | I. 923,117 |
| Coke | 271,420 | 269,245 | D. 2,175 |
| Briquets | 44,577 | 103,350 | I. 58,773 |
| Total | 3,318,025 | 4,297,740 | I. 979,715 |

Exports for the nine months are reported as follows:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Coal | 3 432,188 | 3,730,800 | I. 298,612 |
| Coke | 725,746 | 639,063 | D. 86,683 |
| Briquets | 359,207 | 333,470 | D. 25,737 |
| Total | 4,517,141 | 4,703,333 | I. 186,192 |

The exports exceeded the imports by 1,199,116 tons in 1905, and by 405,593 tons this year.

Imports of fuel into Spain for the eight months ending Aug. 31 were 1,496,323 tons of coal, an increase of 58,586 tons over last year; 134,817 tons of coke, an increase of 43,073 tons.

The export duty of 1s. per ton in Great Britain, which has been levied for about seven years past, ceased Oct. 31, having been removed by the last revenue act. A number of loaded vessels had been waiting for that date at all the coal shipping ports.

Exports of coal from Germany for the nine months ending Sept. 30 were, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Coal | 12,969,107 | 14,561,929 | I. 1,592,822 |
| Brown coal | 14,874 | 12,994 | D. 1,880 |
| Total | 12,983,981 | 14,574,923 | I. 1,590,942 |

Exports of coke for the seven months March-September were 2,026,692 tons; of this 13,218 tons went to the United States. Exports of briquets were 576,439 tons, of which 430,515 tons were made of coal and 145,924 tons of brown coal, or lignite.

Imports of coal into Germany for the nine months ending Sept. 30 were in metric tons:

| | 1905. | 1906. | Changes |
|---|---|---|---|
| Coal | 7,051,100 | 6,581,353 | D. 469,747 |
| Brown coal | 5,776,660 | 6,097,957 | I. 321,297 |
| Total | 12,827,760 | 12,679,310 | D. 148,450 |

Imports of coke for the seven months March-September this year were 328,457 metric tons. Imports of briquets for the same period were 89,185 tons.

## Iron Trade Review

New York, Nov. 14

The iron trade position shows little change. The pressure for pig iron is still considerably in evidence, and high prices are paid for iron. Imports are beginning to arrive and some Scotch and Middlesboro pig is offered, which may tend to relieve the pressure for short deliveries. The quantity of these imports, however, is small in comparison with the total consumption.

The demand for finished steel remains good also, especially for structural material and plates. Railroad equipment orders are an important factor, and promise to continue so for some time. A number of building projects are hung up because of the probable delay in getting deliveries of steel.

*Lake Superior Ore Shipments*—Shipments of Lake iron ore, by ports, for the season to Nov. 1 were as follows, in long tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Escanaba | 4,545,922 | 4,967,360 | I. 421,438 |
| Marquette | 2 631 210 | 2,509.286 | D. 121,924 |
| Ashland | 3,033 774 | 3,049,054 | I. 15,280 |
| Superior | 4,574 407 | 5,352,745 | I. 778,338 |
| Duluth | 7,895,976 | 9,955,216 | I. 2,059,240 |
| Two Harbors | 7,049,326 | 7,405,174 | I. 355,848 |
| Total | 29,730,615 | 33,238,835 | I. 3,508,220 |

The total increase this year was 11.8 per cent. Of the shipments this year 31.7 per cent. came from the old ranges and 68.3 per cent. from the Minnesota ranges.

*New Construction*—The Cleveland *Iron Trade Review* has prepared a statement of new construction in 1906, which gives the following figures for furnaces, and their estimated yearly capacity, in long tons:

| | Completed. | Building. | Planned. |
|---|---|---|---|
| Blast furnaces, No. | 7 | 21 | 27 |
| Capacity | 968,000 | 2,310,000 | 2,965,000 |
| Open-hearth furn's | 21 | 47 | 30 |
| Capacity | 530,000 | 1,016,000 | 1,194,000 |
| Bessemer conv'ters | 2 | ..... | ..... |
| Capacity | 360,000 | ..... | ..... |

The total is 55 blast furnaces with a yearly capacity of 6,243,000 tons; 98 open-hearth furnaces, 2,740,000 tons; two bessemer converters, 360,000 tons.

## Birmingham Nov. 12

Pig-iron prices are still advancing in the Birmingham district, and the demand is strong, even for delivery during the second quarter of the coming year. A few sales of iron have been made for delivery after the second quarter. Spot iron, very scarce, is approaching the high-water mark; in fact, is going above the record. No. 2 foundry iron, immediate delivery, can command now $23 per ton and even $24, if in quantity, and the assertion has been made that $25, the top-notch price, has been offered. Inquiry elicits information that some companies delivering iron sold at the low price, $12.50@13 per ton for No. 2 foundry, which prevailed in July last, are doing everything possible to move out the product and wipe such business off the books. It is stated also that some of the smaller companies, anticipating the rapid advance have been out of the market, and will shortly begin accepting business for delivery during the first quarter of the coming year. Such a policy will prove profitable.

There is no improvement in iron production in this district. Complaint is made of the limited raw-material supply, and of the railroad transportation facilities, both in the raw-material field and after the iron has been manufactured.

Judge T. G. Jones, of the Federal court, has confirmed the sale by the receiver of the properties of the Lookout Mountain Iron Company, which includes a blast iron furnace, mines, coke ovens and commissary supplies. The First National Bank, of Cincinnati, purchased the properties, save the commissary supplies, the price obtained by the receiver being a little over $309,000. The properties originally cost $1,500,000. The sale was resisted by a number of stockholders.

## Chicago Nov. 12

Steady buying of pig iron for both early and late deliveries has continued in the last week. Iron for early delivery continues to be eagerly sought, and there is not much in the market. Northern iron is very scarce, the only obtainable lots being those picked up occasionally by chance, as the furnaces have their product all contracted for up to nearly if not quite the end of the first quarter of 1907. Deliveries for the first quarter command advancing premiums.

Southern irons are in scant supply for early deliveries and are also advancing in price. Contract business in both Southern and Northern extends to large lots frequently, with deliveries running far into the last half of 1907; but most contracts are for medium-sized lots to be delivered in the second and third quarters.

On contracts for next year Northern brings $22@23 and Southern $18@18.50, Birmingham ($21.90@22.40 Chicago). Lake Superior charcoal, in demand and scarce, brings $23 per ton.

## Cleveland Nov. 13

*Iron Ore*—Sales of ore for 1907 delivery were practically completed by last Saturday night. A few small lots are being cleaned up now, but they are not important. Lake rates for 1907 delivery have not been determined, but it is expected that the old basis will be adhered to. Prices quoted a week ago are accurate, being $5 for bessemer Old Range; $4.20 for non-bessemer Old Range; $4.75 for bessemer Mesabi and $3.95 for non-bessemer Mesabi. It is a fair estimate that the total production of ore for 1907 delivery will be close to 42,000,000 tons.

*Pig Iron*—The scarcity of foundry pig iron has been accentuated during the past week and is now becoming quite as acute for second-quarter delivery next year as it is at present time. The current market has been conducive to a rise in price to $25@25.50 at furnace for No. 2 for quick shipment, while buying for first-half delivery has brought about prices of $22@23 at furnace, the latter being nearer the market. No sales are made for first-quarter delivery unless coupled with an order for second quarter. Basic is selling at $25 for spot shipment and at $23 for first half. Bessemer is practically out of the market for the time being. Southern producers are also out of the market and their prices are almost nominal.

*Finished Material*—Billets are scarce and the price depends more upon delivery than anything else. For spot shipment prices range over the unusual spread of $38@40 delivered for the forging quality. For 60 to 90 day delivery they are worth $35@36 at mill. The advance in the price of sheets has not had the effect of checking buying and mills are getting further and further behind with orders. Deliveries cannot be made today inside of three months. Stock business is still the principal trading done here. Shapes and plates are in big demand, with much of the business for spot shipment going to eastern mills, where premiums are demanded.

## New York Nov. 14

*Pig Iron*—The market has been again strong, with a good demand, especially for basic iron. Prices are rather wild, owing to the high figures offered for spot and near deliveries. In the table below, the higher figures are for such deliveries; the lower for second and third quarter. Foreign pig is now offered, Scotch iron being quoted at $23.50@24 ex-ship, and Middlesboro at $22@22.50. To these prices must be added 60c. for unloading.

Current quotations for pig iron are for New York or parallel delivery:

| | |
|---|---|
| **Northern:** | |
| No. 1 X foundry | $23.50@$26 |
| No. 2 X foundry | 23@25.50 |
| No. 2 plain | 21@23.50 |
| Forge pig | 20@21.50 |
| **Southern:** | |
| No. 1 foundry | 23.50@26 |
| No. 2 foundry | 22.50@25 |
| No. 3 foundry | 22@23.50 |
| No. 4 foundry | 21@22.50 |
| No. 1 soft | 23.50@26 |
| No. 2 soft | 22.50@25 |
| Gray forge | 20@21.50 |
| **Basic pig:** | |
| Northern | 21.50@23 |
| Virginia | 22@23.25 |
| Alabama | 22@23.50 |

City or local deliveries are not included in prices, which are for large lots, on docks or cars.

*Cast-Iron Pipe*—Orders are coming in steadily. The minimum price is $32 for 6-in. pipe, carload lots, for 1907 delivery. Premiums are asked for early deliveries.

*Bars*—Bars are strong at 1.845c. tidewater, for common iron, while refined is 1.895c. Steel bars are quoted at 1.695@1.745c., according to size and conditions of orders. Store trade is steady at 2.50c. delivered.

*Structural Material*—More new contracts are forward, chiefly for bridge work. Quotations for tidewater delivery are: Beams, channels and angles, 1.845c.; tees, 1.805c. deckbeams, 1.995c.; On beams 18 to 24 in., and on angles over 6 in., there is an extra of 0.10c. Material from jobbers, out of stock, is 2.25@2.50c. Premiums are the rule for special deliveries.

*Rails*—A considerable demand for trolley rails for next spring is in evidence.

*Old Material*—Dealers are still hustling

after heavy cast scrap and taking their own price from customers. No. 1 yard wrought is $18@19; No. 1 machinery cast, $17.25@17.50. Heavy steel melting scrap is higher at $18@19. Prices are on cars, Jersey City or other tidewater terminal.

### Philadelphia Nov. 14

*Pig Iron*—Pig-iron quotations mean practically nothing at this time, when there is a general scramble for the best deliveries that can be had. The steel plants have been crowding the market for supplies of basic pig, and some purchases have been made aggregating during the past week between 9000 and 10,000 tons that are known of; but these figures do not probably represent all the purchases that have been made. The buyers of basic are straining every energy to cover their requirements and the result will probably be a further advance in price. Large purchases of foundry iron have been made at high figures and the transactions in Middlesboro and Scotch iron almost equal the reported purchases of domestic irons. Premiums are the rule, both north and south, and the quoted prices are not a fair index to the actual prices paid. Alabama iron has been bought in No. 2 for delivery as late as March at $19 per ton. Forge iron is also gobbled up wherever it can be had, but the purchases have been made up of small lots for the most part. There is a feverishness in the pig-iron situation and a great deal more iron is wanted than can be had. Quotations mean very little, but they can be given at $25 for No. 1 X foundry; $23.50 for No. 2 X foundry; $22.50 for No. 2 plain; $21 for standard gray forge and basic; $27 for phosphorus and $23 for Middlesboro on dock.

*Steel Billets*—It is impossible to say anything concerning billets that has not been said before. In some instances as high as $36 has been paid for open-hearth billets and $40 for some kinds of forging steel, though business has been done in both kinds for less money.

*Bars*—Great activity prevails in all kinds of bar iron and steel, which are selling at about the same figure.

*Sheets*—The reports from our sheet-iron people are to the effect that their output is all marketed for some time to come, and that the present tendency in prices is strongly upward.

*Plates*—The rumor is renewed that there is to be an advance in plates, but there is no occasion for rumors of this sort. All the manufacturers need do is to put up prices when they are ready.

*Structural Material*—The pressure for bridge material is not so great as a month ago, but on the other hand the mills are less able to accommodate the customers who are coming along.

*Steel Rails*—The pressure at present is for girder rails for electric lines. A big week's business has been done.

*Scrap*—The scrap market has quieted down a little, after several of the larger consumers have bought what they wanted. There is no railroad scrap to be had at this time. Choice No. 1 yard scrap is pretty well cleaned up and brings $20. Steel crops are quoted at $19.50 and No. 1 steel scrap at $18.50. Machinery scrap is $19 per ton.

### Pittsburg Nov. 13

An advance of $1 a ton in prices of light steel rails was ordered this morning by the Carnegie Steel Company, effective at once. The American Steel and Wire Company ordered an advance of $1 a ton in wire and wire nails, effective Saturday, Nov. 10. The expected advance of $2 a ton on steel hoops was announced late last week, establishing a price of 2c. a pound. Another advance of $2 a ton in iron bars has been made by the Republic Iron and Steel Company and other large interests, and the price on all future business is fixed at 1.80c. f.o.b. Pittsburg. An advance in the price of merchant steel bars now seems certain and may be ordered at any time. The present rate is 1.50c, which is $10 a ton under the price of steel hoops and $6 a ton less than the new price for iron bars.

The new prices for light rails are as follows: 8-lb., $39; 12-lb., $36; 16-lb. to 20-lb., $33@34; 20-lb. to 45-lb., $32@33.

On wire products the new prices to jobbers are as follows: Wire nails, $1.90 a keg; plain wire, 1.75c.; painted barb wire, 2.05c.; galvanized wire, 2.35c.; smooth fence wire, 1.75c.

All light-rail makers are behind in deliveries and premiums over the old prices have been freely paid for prompt shipment. The leading interest is said to be booked up to April 1. Independent light-rail producers have not been following the quotations of the leading interest and, it is reported, have been getting higher prices for more than a month. The advance ordered by the leading wire interest has been followed by the independents and all the mills are crowded with business and are being operated to capacity. New business in all finished lines is being booked daily, except in structural material, the demand being light this week, and mills are said to be but three weeks behind in deliveries. In other lines mills are active and from six weeks to three months behind.

A leading ore producer today announced that all the bessemer ore for next season is under contract, and that the non-bessemer ores will be sold within the next three weeks. The supply of bessemer ore for the coming year will be less than during the past season. The advance in prices announced last week did not have any effect on the buying movement.

The bi-monthly adjustment of wages under the annual agreement with the Amalgamated Association of Iron, Steel and Tin Workers was made at the office of the Republic Iron and Steel Company. The sales of common iron bars averaged 1.5c., the examination of the sales sheets showing no change since July 1. The wages of the skilled workers will remain the same, the pay of the puddlers being $5.75 a ton.

*Pig Iron*—The market for bessemer iron for third quarter has not opened, but likely will before the end of the week. Producers have been unable to agree on prices and the market will be open. Sales of basic iron for the last half, aggregating about 25,000 tons, have been made at $21, Valley furnaces, and some producers are quoting the same price for bessemer. Several producers insist that there should be a spread of at least 50c. a ton between bessemer and basic iron. Inquiries for bessemer iron aggregating more than 50,000 tons have been received for third-quarter delivery, but so far no sales have been made. It is likely that the minimum price will be around $21. For spot shipment it is impossible to buy bessemer. One consumer today offered $25 for a small lot. Foundry iron also is scarce and prices continue high. One sale of No. 2 foundry, of 500 tons, was closed today at $24.25, Pittsburg. A similar tonnage of No. 1 foundry was sold at $24.75, delivered. Several lots of low-phosphorus iron, aggregating about 600 tons, sold at prices ranging from $27.25 to $27.75, Pittsburg. Gray forge is quoted at $22.85, Pittsburg, and one lot of 500 tons sold at that figure.

*Steel*—The billet market has improved slightly and small tonnages are available, but prices remain very irregular. A lot of 1000 tons of bessemer billets is reported to have been sold at $28, the minimum price quoted for over two months, while several lots of open-hearth billets sold at $32. Sheet bars are quoted at $30, but sales for prompt shipment have been made at $1 and $2 higher. Plates remain at 1.60c. and steel bars at 1.50c. An advance of from $2 to $4 a ton may be ordered in a few days.

*Sheets*—The demand for sheets continues in excess of production and the mills are unable to catch up on deliveries. Prices are firm, black sheets being quoted at 2.60c. and galvanized at 3.65 for No. 28 gage.

*Ferro-Manganese*—The market has eased up and 80 per cent. is quoted this week at $81@82 for any delivery this year.

### Brussels, Belgium Nov. 6

Exports of iron and steel from Belgium for the nine months ended Sept. 30 are reported as below, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Pig iron and scrap.. | 59,195 | 77,925 | I. 18,730 |
| Blooms, billets, etc. | 11,282 | 24,577 | I. 13,295 |
| Finished iron & steel | 569,253 | 597,384 | I. 28,131 |

Exports of iron ore for the nine months were 337,096 tons in 1905, and 362,599 tons in 1906; an increase of 25,503 tons. The increase in iron and steel exports this year has been large.

### Cartagena, Spain Oct. 27

*Iron and Manganiferous Ores*—Messrs. Barrington & Holt report that there were no shipments of iron ore during the week, owing to the great scarcity of tonnage and high rates of freight. Mining operations have been somewhat interrupted by the continued unsettled state of the weather, heavy rains impeding production and doing considerable damage to mining generally, especially in the lead and zinc mines, where washing and crushing is carried on practically in the open.

Quotations are 9s. 1d.@9s. 4d. for ordinary 50 per cent. ore; 9s. 7d.@9s. 10d. for low phosphorus; 11s. for S. P. Campanil; 12s. 4d. for specular ore, 58 per cent. Manganiferous ores range from 13s. 3d. for 35 per cent. iron and 12 manganese up to 15s. 6d. for 25 per cent. iron and 17 manganese. All prices are f.o.b. shipping port.

*Pyrites*—Iron pyrites, 40 per cent. iron and 43 sulphur, are 11s. per ton, f. o. b. shipping port. Shipments for the week were 180 tons of copper-bearing pyrites to St. Louis du Rhone.

### Dusseldorf, Germany Oct. 28

The German Iron and Steel Union reports the output of the blast furnaces in September at 1,036,753 metric tons of pig iron. This is 28,204 tons less than in August, but the difference is less than that due to the shorter month. The daily average was 34,353 tons in August and 34,558 tons in September. For the nine months ended Sept. 30 the total output was, in metric tons:

| | 1905. Tons. | 1905. Per Ct. | 1906. Tons. | 1906. Per Ct. |
|---|---|---|---|---|
| Foundry iron | 1,379,000 | 17.3 | 1,583,193 | 17.1 |
| Forge iron | 597,450 | 7.5 | 638,731 | 6.9 |
| Steel pig | 501,005 | 6.3 | 695,613 | 7.5 |
| Bessemer pig | 315,614 | 4.0 | 354,880 | 3.8 |
| Thomas pig | 5,170,527 | 64.9 | 6,000,566 | 64.7 |
| Total | 7,963,596 | 100.0 | 9,272,983 | 100.0 |

The gains this year were, in foundry iron, 204,193 tons; forge iron, 41,281; steel pig—which includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys—194,608; bessemer pig, 39,266; Thomas, or basic, pig, 830,039; total increase, 1,309,387 tons, or 16.4 per cent.

The production of coal in Germany for the nine months ended Sept. 30 is reported as follows, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Coal | 89,156,884 | 102,073,748 | I. 12,916 864 |
| Brown coal | 37,560,666 | 40,778,138 | I. 3,217,472 |
| Total mined | 126,717,550 | 142,851,886 | I. 16,134,336 |
| Coke made | 10,874,526 | 14,937,211 | I. 4,062,685 |
| Briquets made | 9,428,036 | 10,733,223 | I. 1,305,187 |

The increase in coal mined was 12.7 per cent. A large part of the briquets reported is made from brown coal, or lignite.

## Chemicals

NEW YORK, Nov. 14

*Copper Sulphate*—There is nothing new to report in this market. The demand is strong and steady and supplies are not too abundant. Prices remain unchanged at $7 per 100 lb. for carload lots, with smaller parcels bringing $7.25@7.50, depending upon terms and quantity.

*Nitrate of Soda*—Demand continues good and prices steady, with rather an upward tendency, though there has been no actual advance.

*Phosphates*—Exports of Florida phosphates through the port of Savannah in October are reported by Messrs. J. M. Lang & Co. as follows: Hamburg, 3529 tons; Bremen, 2170; Trieste, Italy, 1666; total, 7365 tons.

## Metal Market

NEW YORK, Nov. 14.

**Gold and Silver Exports and Imports.**
**At all United States Ports in September and year.**

| Metal. | Exports. | Imports. | Excess. |
|---|---|---|---|
| Gold: | | | |
| Sept. 1906 | $2,278,922 | $31,419,932 | Imp. $29,141,010 |
| " 1905 | 1,412,904 | 5,432,692 | " 4,130,788 |
| Year 1906 | 35,790,962 | 111,764,911 | " 75,973,949 |
| " 1905 | 42,677,921 | 30,339,602 | Exp. 12,338,319 |
| Silver: | | | |
| Sept. 1906 | 3,594,311 | 3,253,586 | " 340,725 |
| " 1905 | 5,527,459 | 3,840 000 | " 1,687,454 |
| Year 1906 | 45,441,339 | 32,985,096 | " 12,456,243 |
| " 1905 | 39,443,210 | 24,506,998 | " 14,936,212 |

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

**Gold and Silver Movement, New York.**
**For week ending Nov. 10 and years from Jan. 1.**

| Period. | Gold. Exports. | Gold. Imports. | Silver. Exports. | Silver. Imports. |
|---|---|---|---|---|
| Week | $ 17,000 | $ 252,201 | $ 492,720 | $ 12,424 |
| 1906 | 6,039,183 | 92,662,336 | 45,473,330 | 1,903,504 |
| 1905 | 34,509,503 | 10,482,569 | 30,021,374 | 3,861,519 |
| 1904 | 96,895,489 | 6,382,842 | 33,416,850 | 1,113,853 |

The gold exported for the week went to Mexico; the silver to London. The gold imported for the week came chiefly from Cuba; the silver from Mexico.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Nov. 10 gives the following totals, comparisons being made with the corresponding week of 1905:

| | 1905. | 1906. |
|---|---|---|
| Loans and discounts | $1,044,287,800 | $1,045,498,200 |
| Deposits | 1,028,318.800 | 998,754,500 |
| Circulation | 54,310,700 | 50,544,400 |
| Specie | 182,266,300 | 181,803,400 |
| Legal tenders | 72,384,600 | 66,371,100 |
| Total reserve | $254,650,900 | $248,174,500 |
| Legal requirements | 257,079,700 | 249,688,625 |
| Deficit | $ 2,428,800 | $ 1,514,125 |

Changes for the week this year were an increase of $1,519,700 in circulation; decreases of $7,292,700 in loans, $17,069,700 in deposits, $5,846,800 in specie and $2,982,500 in legal tenders. The reserve shows a deficit instead of a surplus, for the third time this year.

The following table shows the specie holding, in dollars, of the leading banks of the world:

| | Gold. | Silver. | Total. |
|---|---|---|---|
| New York | ..... | ..... | $181,803,400 |
| England | $145,944,875 | ..... | 145,944,875 |
| France | 562,921,905 | $203,554,815 | 766,476,720 |
| Germany | 139,285,000 | 46,430,000 | 185,715,000 |
| Spain | 76,615,000 | 120,800,000 | 197,415,000 |
| Netherlands | 27,656,000 | 27,700,500 | 55,356,500 |
| Belgium | 16,366,665 | 8,133,335 | 24,500,000 |
| Italy | 154,915,000 | 18,722,000 | 173,637,000 |
| Russia | 566,675,000 | 20,690,000 | 588,365,000 |
| Austria | 233,000,000 | 58,905,000 | 291,905,000 |
| Sweden | 19,820,000 | ..... | 19,820,000 |

The returns of the associated banks of New York are of date Nov. 10, and the others Nov. 9. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

The Treasury Department on Nov. 12 received offers for the sale of silver to the Government at 72c. per fine ounce. These offers were rejected, and Secretary Shaw stated subsequently that no more silver would be bought at present high prices. The Government has on hand, he said, silver enough to keep the mints in operation for some time to come, and he regards the present prices as too high to warrant the Government in making any more purchases at those figures. The Treasury Department began its present purchases Aug. 6, and since that time approximately 5,500,000 ounces have been purchased at prices ranging from 69.20 to 71.92c. per ounce.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to Nov. 1:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| India | £5,125,821 | £ 13,372,896 | I. £ 8,247,075 |
| China | 804,246 | 430,700 | D. 373,546 |
| Straits | 38,299 | 1,750 | D. 36,549 |
| Total | £ 5,968,366 | £ 13,805,346 | I. £ 7,836 980 |

Imports for the week were £10,000 from the West Indies, £123,000 in bars and £5200 in Mexican dollars from New York; a total of £138,200. Exports were £21,200 in bars and £60,000 in Mexican dollars; £81,200 in all, to India.

Indian exchange is quiet, with only a moderate demand. The Council bills offered in London were taken at an average of 16.01d. per rupee. Buying of silver for India has been only moderate.

The movement of gold and silver in France for the nine months ending Sept. 30 was as follows:

| Gold: | 1905. | 1906. |
|---|---|---|
| Imports | Fr. 694,671,000 | Fr. 384,378,000 |
| Exports | 75,474,000 | 97,568,000 |
| Excess, imports | Fr. 619,197,000 | Fr. 286,810,000 |
| Silver: | | |
| Imports | 75,548,000 | 113,394,000 |
| Exports | 61,609,000 | 83,633,000 |
| Excess, imports | Fr. 13,939,000 | Fr. 29,761,000 |

Imports of copper and nickel coins, rated at their face value, were 127,000 fr. in 1905, and 84,000 fr. in 1906; exports were 272,000 fr. in 1905, and 160,000 fr. this year.

### Prices of Foreign Coins

| | Bid. | Asked. |
|---|---|---|
| Mexican dollars | $0.55 | $0.57 |
| Peruvian soles and Chilean | 0.50 | 0.52 |
| Victoria sovereigns | 4.85½ | 4.87½ |
| Twenty francs | 3.87 | 3.91 |
| Spanish 25 pesetas | 4.78 | 4.80 |

SILVER AND STERLING EXCHANGE.

| Nov. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. | Nov. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. |
|---|---|---|---|---|---|---|---|
| 8 | 4.85¾ | 71¼ | 32⅞ | 12 | 4.85¾ | 71¾ | 32 15/16 |
| 9 | 4.85¾ | 71⅜ | 32 15/16 | 13 | 4.85½ | 71½ | 33 |
| 10 | 4.85¾ | 71¼ | 32 15/16 | 14 | 4.85½ | 71¾ | 32 15/16 |

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

The silver market for the past week has been firm. Prices have been well maintained, and the tendency has been a slightly advancing one. Some of the edge of the advance was taken off by the Secretary of the Treasury being reported as saying the Government would be out of the market if the present price was sustained.

### Other Metals

Daily Prices of Metals in New York.

| November. | Copper. Lake, Cts. per lb. | Copper. Electrolytic, Cts. per lb. | Copper. London, £ per ton. | Tin. Cts. per lb. | Lead. Cts. per lb. | Spelter. New York, Cts. per lb. | Spelter. St. Louis, Cts. per lb. |
|---|---|---|---|---|---|---|---|
| 8 | 22¼ @22½ | 21⅝ @22 | 98½ | 42⅝ | 5.75 | 6.30 @6.35 | 6.15 @6.20 |
| 9 | 22¼ @22½ | 21⅝ @22 | 99 | 42¾ | 5.75 | 6.35 | 6.20 |
| 10 | 22¼ @22⅜ | 21⅝ @22 | ..... | 42¾ | 5.75 | 6.35 | 6.20 |
| 12 | 22¼ @22½ | 21⅝ @22 | 99 3/16 | 42⅞ | 5.75 | 6.35 @6.40 | 6.20 @6.25 |
| 13 | 22¼ @22½ | 21⅝ @22 | 99¾ | 42¾ | 5.75 | 6.35 @6.40 | 6.20 @6.25 |
| 14 | 22¼ @22½ | 21⅝ @22 | 99¾ | 42¾ | 5.75 | 6.35 @6.40 | 6.20 @6.25 |

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations on spelter are for ordinary western brands; special brands command a premium.

*Copper*—The market continues fairly active, the predominating feature being a scarcity of supplies available for delivery this year. Transactions have been almost entirely confined to contracts for domestic consumption, the European buyers preserving a waiting attitude. This latter situation no doubt is a result of their having provided for supplies on a rather liberal scale some weeks ago. The closing quotations are 22¼@22½ for Lake copper; 21⅝@22c. for electrolytic in ingots, cakes and wirebars; while 21⅜@21⅝ represents the average for casting.

The prices for spot standard in the London market moved within narrow limits, while a heavy speculation developed in futures. The close is firm at £99 7s. 6d. for spot, £100 17s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £101@102; best selected, £104@105; strong sheets, £108 @109.

*Copper*—Exports of copper from New York for the week were 2002 long tons. Our special correspondent reports the exports from Baltimore for the week at 200 long tons of fine copper.

*Copper Sheets*—The base price of copper sheets, as established by the manufacturers, is 27c. per lb. This price is subject to change without notice.

*Tin*—Consumers have shown very little interest in this metal and transactions are of a retail nature only. The market closes at about 42½@42¾, depending upon deliveries.

The London market also is bare of any excitement and closes steady at £194 15s. for spot, £196 5s. for three months.

Shipments of tin from the Straits Settlements to the United States and Europe for the 10 months ending Oct. 31 were 46,022 long tons in 1905, and 47,543 tons in 1906; an increase of 1521 tons this year.

*Lead*—There is no change in the quotation of 5.75c. New York.

The London market has been quiet and closes steady at £19 7s. 6d. for Spanish lead, £19 10s. for English lead.

The movement of foreign lead in the United States for the nine months ending Sept. 30 is reported by the Bureau of Statistics as follows, in short tons:

| | |
|---|---|
| In bond, Jan. 1 | 8,148 |
| Imports, nine months | 67,402 |
| Total supplies | 75,550 |
| Re-exports, nine months | 35,908 |
| In bond, Oct. 1 | 6,033 |
| Total deductions | 41,941 |
| Balance | 33,609 |

This balance has, presumably, entered into consumption in the United States.

*Spanish Lead Market*—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Oct. 27, that the price of pig lead is 91.50 reales per quintal, silver being paid for at 14.25 reales per ounce. Exchange, 27.57 pesetas to £1. The price of lead, on current exchange, is equal to £18 11s. 7d. per long ton, f.o.b. Cartagena. Shipments for the week were 65 tons to Marseilles, 200 tons to Newcastle and 300 tons to Amsterdam; a total of 565 tons, all desilverized lead.

*Spelter*—Inquiry from consumers continues and business has been done at a satisfactory rate. Prices have improved somewhat and the close is firm at 6.35 @6.40 New York, 6.20@6.25 St. Louis.

The London market is slightly firmer as a result of an improved demand and very limited supplies. The closing prices are £27 17s. 6d. for good ordinaries, £28 2s. 6d. for specials.

*Spanish Zinc Ore Market*—Messrs. Barrington & Holt report from Cartagena, Spain under date of Oct. 27, that the market remains quiet. No shipments for the week.

*Zinc Sheets*—The price of zinc sheets is $7.90 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The base price for sheet zinc has varied little this year; the highest was $8 on Jan. 6, the lowest $7.65 on May 18.

*Aluminum*—The chief producer gives list prices for ton lots and over as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. up, according to size.

*Antimony*—Continues to be extremely firm and large transactions for future delivery are being reported. Spot metal is practically cornered and selling at 24¼ @25 for ordinary brands, 25@25½ for Hallett's, 26c. for Cookson's. Future deliveries are comparatively cheaper.

*Nickel*—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

*Platinum*—Demand continues strong, and prices have advanced sharply. Unmanufactured platinum is quoted at $38 per oz., while $30@31.50 is paid for good scrap.

*Quicksilver*—This metal remains steady, with no material changes. The New York quotation is $40.50@42 per flask of 75 lb., according to size and conditions of order. San Francisco quotations are $39@40 per flask for home orders, and $37@38 for export. The London price is £7 per flask, with £6 18s. 9d. named by jobbers.

*Cadmium*—The Grasselli Chemical Company, of Cleveland, Ohio, has begun to prepare cadmium for sale. Heretofore the supply has come from Germany.

### Missouri Ore Market

JOPLIN, Nov. 10

The highest price rumored paid for zinc was $49 per ton; the assay basis price $43@45 per ton of 60 per cent. zinc; the average price was $43.82.

The highest price reported paid for lead was $84 per ton; medium grades $80@83; average all grades, $89.18.

Lack of cars for moving the ore caused a decrease of 1220 tons in the shipment,

compared with the previous week, which was 846 tons less than the preceding week. With over 5000 tons in the bins of the district purchased, the shipment would have been enormous but for the lack of cars.

Buyers continue purchasing zinc ore about as fast as outputted, because the smelters want the ore, and none will desist for fear another concern will secure the larger tonnage.

Further effort on the part of the local lead concerns to regain a lost foothold in the field resulted in the advance of lead, an increase for a few bins being noted at $2 per ton; but while the local smelters are forcing higher prices on the St. Louis concern in some places, that company's buyer secures some ore in other places at lower prices, consequently there is little difference in average prices.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

| | Zinc, lb. | Lead, lb. | Value. |
|---|---|---|---|
| Webb City-Carterville. | 2,184,800 | 654,610 | $74,249 |
| Joplin | 2,242,540 | 239,880 | 61,173 |
| Galena-Empire | 945,040 | 217,630 | 29,026 |
| Alba | 962,740 | 37,510 | 24,124 |
| Duenweg | 580,430 | 229,650 | 21,955 |
| Neck City | 568,290 | | 13,354 |
| Oronogo | 347,090 | 70,460 | 10,537 |
| Badger | 355,870 | 3,750 | 8,513 |
| Spurgeon | 255,010 | 40,930 | 6,992 |
| Granby | 350,000 | 45,000 | 6,200 |
| Prosperity | 170,890 | 47,720 | 5,667 |
| Aurora | 317,460 | 8 660 | 5,204 |
| Baxter | 244,870 | | 5,136 |
| Sherwood | 136,090 | 40,780 | 4,620 |
| Zincite | 95.130 | | 2,093 |
| Cave Springs. | 83,340 | | 1 792 |
| Totals | 9,839,590 | 1.636,580 | $280,640 |
| 5 weeks | 480,130,010 | 67,793,920 | $12,985,085 |
| Zinc value, the week, $215.102; 45 weeks, $10,370,143 | | | |
| Lead value, the week, 65,538; 45 weeks, 2,614,942 | | | |

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

| ZINC ORE AT JOPLIN. | | | LEAD ORE AT JOPLIN. | | |
|---|---|---|---|---|---|
| Month. | 1905. | 1906. | Month. | 1905. | 1906. |
| January... | 52.00 | 47.38 | January.... | 61.50 | 75.20 |
| February... | 52.77 | 47.37 | February... | 57.62 | 72.83 |
| March..... | 47.40 | 42.68 | March..... | 57.20 | 73.73 |
| April..... | 42.88 | 44.63 | April..... | 58.00 | 75.13 |
| May. ..... | 43.31 | 40.51 | May..... | 58.27 | 78.40 |
| June..... | 40.75 | 43.83 | June..... | 57.80 | 80.96 |
| July. ..... | 43.00 | 43.25 | July..... | 58.00 | 74.31 |
| August..... | 48.83 | 43.56 | August..... | 58.00 | 75.36 |
| September. | 46.75 | 42.58 | September. | 63.50 | 79.64 |
| October.... | 47.60 | 41.55 | October..... | 63.86 | 79.84 |
| November.. | 49.55 | .... | November.. | 68.67 | .... |
| December.. | 49.00 | .... | December.. | 76.25 | .... |

## Wisconsin Ore Market

PLATTEVILLE, Nov. 3

The price of 60 per cent. ore opened up the first of the week the same as last week. Toward the middle of the week one of the buyers raised the price $1.50 per ton. Toward the latter part of the week the price ranged from $1 to $2 higher than last week. Lead, sulphur and drybone remain the same.

The camps of the Platteville district loaded ore for the week ending Nov. 10, as follows:

| Camps. | Zinc, Lb. | Lead, Lb. | Sulphur, Lb. |
|---|---|---|---|
| Platteville | 430,475 | 43,700 | |
| Mineral Point | 312,500 | | |
| Cuba City | 293,260 | 52,290 | |
| Highland | 233,550 | | |
| Benton | 161,000 | | |
| Livingston | 108 000 | | |
| Rewey | 106,000 | | |
| Buncombe & Hazel Green | 65,500 | | |
| Linden | 56,400 | | |
| Harker | 34,380 | | |
| Total for week | 1,801,015 | 95,990 | |
| Year to Nov. 10. | 66,472,826 | 3,111,890 | 3,493,030 |

All indications point to a strong market for the coming week.

## Mining Stocks

NEW YORK, Nov. 13

The condition on the New York Stock Exchange at present is one of extreme lethargy. The public is remaining out almost entirely, preferring to wait for easier money, and the little trading that is done is purely professional. The expectation that the market would liven and that prices would advance after the election has not been realized. In fact, the reverse has occurred and prices have sagged materially. Amalgamated has been very weak, selling off to $109½ from $112⅜ and closing at $110½. American Smelting common was weak, closing at $154¼. The preferred held stronger but both lacked the strength which they had.

The curb has shown considerable strength and it has been evident that the lower-priced mining shares have been extremely popular with the general public. The Cobalt mining stocks have been well to the front and several new stocks have been taken up and pushed vigorously. Nipissing has been active, but the price has receded on profit-taking and the close is lower than has been recorded for some time. The last quotation was $29 per share. Other active Cobalt stocks were Colonial Silver, Foster-Cobalt, Cobalt Contact, and McKinley-Darragh, all of which were heavily dealt in.

Among the other curb stocks British Columbia, Cumberland-Ely, Davis-Daly, El Rayo, Gold Hill, Micmac, and Mohawk were the most prominent.

On the stock exchange 100 shares of Homestake were sold at $100 per share.

### Boston Nov. 13

Prices showed considerable reaction during the week, but have now apparently steadied. The injunction in the Utah courts against the smoke and sulphur nuisance caused by smelter fumes brought a sharp break in the shares of Utah Consolidated, United States Smelting and Bingham. The first named broke $7.62½ to $61, with recovery today to $63.50. United States Smelting fell $2.25 to $61.25, and Bingham $4.25 to $28.25. The stay of proceedings today brought a better feeling, and prices recovered somewhat.

Allouez is off $2 to $36, and Centennial, which fell $3.50 to $28.25, recovered $1 of it. These companies, both under the same management, propose to form a holding company, to acquire the latter's mill property, the Centennial to receive half of the stock, and Allouez the other half. The mill has three stamps and foundations for three more, which will suffice for both companies. This will enable the Centennial to pay off its $300,000 worth of notes due next spring.

Amalgamated's low point was $109, but it closed at $110.37½ tonight, against $112 a week back. Copper Range took a $3.25 drop to $80, closing tonight at $81. This company is expected to increase its next dividend payment. Although over 10,000 shares of Greene Consolidated stock have been liquidated in this market, the stock is only off $1 net for the week. Osceola fell $3 to $125; Old Dominion $5.50 to $57.50; Isle Royale, $2.50 to $21.50; Franklin, $2.37½ to $20.37½, and Atlantic, $1.50 to $13.50. North Butte ran off $3.62½ to $108.75, but recovered to $110.50, and Butte Coalition $3 to $34.87½, the latter rallying to $36. Calumet & Arizona after touching $159, broke to $150, with recovery to $155 today.

Of the low-priced shares Arcadian and Santa Fé have attracted attention. The former touched $7.25, and the latter $4.25. Directors of the Arcadian issued a statement showing that the company's debt Oct. 12 was $714,471. Mexico Consolidated's 240,000 shares were placed on the regular list of the Stock Exchange today, and the stock was quite active at $13@13.37½.

Nipissing was driven off over $3 on the curb to $27.50, on a report that the Guggenheims had not exercised their option on the 400,000 shares at $25. The latest is that John Hays Hammond will be elected president of the Nipissing Mines Company, and several new Cobalt properties have made their appearance on the curb.

### Colorado Springs Nov. 9

The market has been quite active in Cripple Creek stocks, and the prospect list has been especially so. This being election week, it was expected that the interest in stocks would be considerably less. The Dillon property on Battle mountain has been formally taken over by the Granite Mining Company, which paid in the neighborhood of $125,000 for the property.

### San Francisco Nov. 8

The market has been strong and excited all the week, with heavy sales. The Comstocks have held their own all around, and some have advanced. The greatest gains were in Goldfields, nearly every stock on the list having advanced. Tonopahs were also heavy traders, while the Bullfrog and Manhattan stocks were not far behind. The general excitement and heavy trading brought back memories of the old times, such as the exchange here has not seen for many years.

# STOCK QUOTATIONS

NEW YORK, Nov. 10.

| Name of Company. | High | Low | Clg. | Sales |
|---|---|---|---|---|
| Amalgamated* | 112¾ | 110¼ | 110¼ | 117,110 |
| Anaconda | 273¾ | 267 | 268¾ | 38,400 |
| British Col. Copper | 15 | 14 | 14 | 37,200 |
| Butte Coalition | 38 | 36¾ | 36¾ | 1,515 |
| Cum. Ely Mining | 13¾ | 12⅝ | 12¾ | 7,300 |
| Greene Gold | 2 | 1⅞ | 2 | 1,000 |
| Greene Gold & Silver | 2 | 1⅞ | 2 | 4,100 |
| Guanajuato | 4¾ | 4¾ | 4¾ | 75 |
| Micmac | 6⅜ | 6⅛ | 6¼ | 19,200 |
| Mines Co. of Am | 1⅞ | 1⅝ | 1⅞ | 12,700 |
| Mitchell Mining | 6⅝ | 6¼ | 6⅝ | 7,165 |
| Mont. Sho. Con. (New) | 17¼ | 16 | 16¾ | 4,500 |
| Nev. Utah M. & S. | 4⅞ | 4½ | 4½ | 5,200 |
| Nipissing Mines | 31⅜ | 27⅜ | 30 | 93,000 |
| Tennessee Copper | 45⅜ | 43 | 44 | 2,070 |
| Union Copper | 1 | 1 1/16 | 1 1/16 | 1,800 |
| Utah Apex | 8 | 7⅞ | 7⅞ | 310 |

NEW YORK INDUSTRIALS.

| | | | | |
|---|---|---|---|---|
| Am. Smelting & Ref. | 156¼ | 153¾ | 153⅝ | 39,100 |
| Am. Smelt. & Ref., Pf. | 118⅜ | 117⅛ | 117¼ | 1,000 |
| Bethlehem Steel | 18⅝ | 18⅜ | 18⅜ | 100 |
| Colo. Fuel & Iron | 53½ | 51 | 51¼ | 11,025 |
| Federal M. & S., Pf.* | 97⅞ | 96¼ | 97 | 900 |
| Inter. Salt* | 37 | 37 | 37 | 135 |
| National Lead | 77 | 75 | 75 | 6,470 |
| National Lead, Pf | 103¾ | 103 | 103 | 520 |
| Pittsburg Coal | 16¾ | 16¾ | 16¾ | 1,300 |
| Republic I. & S. | 36¼ | 35 | 35¼ | 3,300 |
| Republic I. & S., Pf. | 98 | 97¼ | 97½ | 1,700 |
| Sloss-Sheffield | 74 | 73 | 73 | 1,400 |
| Tenn. C. & I. | 161 | 161 | 161 | 100 |
| U. S. Red. & Ref | 30 | 28 | 28 | 200 |
| U. S. Steel | 47¾ | 46¾ | 46⅜ | 210,754 |
| U. S. Steel, Pf. | 107⅜ | 104⅛ | 104⅝ | 28,010 |
| Va. Car. Chem | 38¼ | 36½ | 37 | 2,100 |

BOSTON Nov. 10

| | | | | |
|---|---|---|---|---|
| Adventure | 6¾ | 6 | 6 | 725 |
| Allouez | 39 | 35¾ | 36 | 1,992 |
| †Am. Zinc | 31½ | 30¾ | 30¾ | 240 |
| Arcadian | 7¼ | 6¾ | 6¾ | 25,330 |
| Atlantic | 15 | 14 | 14½ | 862 |
| Bingham | 33¼ | 29½ | 29½ | 5,474 |
| Boston Consolidated | 32⅞ | 30¼ | 30¾ | 3,099 |
| Calumet & Arizona | 159 | 149⅜ | 154 | 4,911 |
| Calumet & Hecla | 880 | 855 | 865 | 89 |
| Centennial | 32⅝ | 29½ | 30 | 9,511 |
| Copper Range | 84½ | 81¾ | 82 | 13,294 |
| Daly-West | 20¼ | 19½ | 19½ | 1,565 |
| Franklin | 23 | 21½ | 21⅝ | 1,417 |
| Granby | 13¾ | 13 | 13 | 1,300 |
| Greene Consolidated | 27½ | 25 | 25¾ | 38,586 |
| Isle Royal | 24½ | 23 | 23 | 1,722 |
| Mass | 9 | 8 | 8½ | 1,255 |
| Michigan | 18⅝ | 17½ | 18 | 4,237 |
| Mohawk | 68¾ | 66 | 67 | 1,700 |
| Mont. Coal & Coke new | 2¼ | 2 | 2 | 2,630 |
| Nevada | 21¾ | 20¼ | 20½ | 2,085 |
| North Butte | 114 | 111 | 111¼ | 11,176 |
| Old Dominion | 63 | 58⅛ | 59¾ | 7,737 |
| Osceola | 128½ | 125½ | 126 | 1,550 |
| Parrot | 27⅞ | 26 | 27 | 850 |
| Quincy | 104½ | 102 | 102 | 566 |
| Rhode Island | 4⅞ | 4½ | 4½ | 1,065 |
| Shannon | 16⅝ | 15⅜ | 16 | 12,429 |
| Tamarack | 100 | 100 | 100 | 54 |
| Tecumseh | 15¾ | 14½ | 15 | 1,645 |
| Trinity | 12 | 11⅜ | 11⅜ | 2,809 |
| *United Copper, com. | 72½ | 68 | 71⅝ | 4,775 |
| *United Copper, pf. | 100 | 100 | 100 | 20 |
| U. S. Oil | 10½ | 10 | 10 | 465 |
| U. S. Smg. & Ref. | 65 | 62½ | 63 | 7,091 |
| U. S. Smg. & Ref., pfd. | 46 | 44⅝ | 45 | 4,636 |
| Utah Copper | 69 | 62½ | 62⅝ | 30,600 |
| Victoria | 6⅝ | 6¾ | 6½ | 590 |
| Winona | 10¾ | 9½ | 9½ | 1,135 |
| Wolverine | 162 | 158 | 160 | 795 |
| Wyandotte | 1½ | 1¼ | 1¼ | 300 |

*Ex. Div. †Ex. Rights.

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 25½—25; Comstock, .30—.28; Davis-Daly Est., 14—13; Gold Hill, 7½—5⅞; Gugg. Exp., 326; Rich. Eureka, 7¾; Standard Oil, 598—590. (Boston) Ahmeek, 100; Am. Zinc, †31½—†30¾; Arcadian, 7¼—6¼; Ariz. Com'l, 37½—37; Black Mt., 10¼—10; Cananea, 25—24⅜; East Butte, 12—11; Keweenaw, 12—11½; Majestic, 3⅞—3¾; Raven, .84; Shawmut, 1⅞—1¼; Superior Cop., 16¼; Superior & Pitts., 28½—27½; Troy-Manhattan, 4¼—4⅛.

PHILADELPHIA Nov. 10

| Name of Company. | High | Low | Clg. | Sales. |
|---|---|---|---|---|
| American Cement | 10⅝ | 10 | 10⅛ | 13,611 |
| Cambria Steel | 37¾ | 37⅛ | 37¼ | 1,310 |
| General Asphalt | 7 | 7 | 7 | 100 |
| Penn. Steel, pd | 105 | 105 | 105 | 12 |
| Philadelphia Co | 49½ | 49 | 49 | 16 |
| Tonopah Mining | 20¼ | 20 | 20⅛ | 3,121 |

COLORADO SPRINGS Nov. 10

| Name of Company. | High | Low | Clg | Sales |
|---|---|---|---|---|
| Acacia | 13 | 12⅝ | 12⅝ | 5,000 |
| C. C. Con | 7⅛ | 6⅞ | 7 | .... |
| Dante | 6¾ | 6 | 6 | .... |
| Doctor Jack Pot | 8½ | 8 | 8⅛ | 4,100 |
| Elkton | 52 | 51½ | 52 | 44,750 |
| El Paso | 52½ | 51¾ | 52 | 4,000 |
| Findley | 57⅛ | 57 | 57¼ | 3,500 |
| Gold Dollar | 8¼ | 7 | 7 | .... |
| Gold Sovereign | 6⅝ | 6¼ | 6½ | .... |
| Isabella | 23 | 21¾ | 22¾ | 23,500 |
| Jennie Sample | 9 | 8¾ | 8¾ | 15,000 |
| Mary McKinney | 73 | 71 | 72 | .... |
| Pharmacist | 6½ | 6¾ | 6¾ | 23,000 |
| Portland | 1.32 | 1.30 | 1.30 | 2,000 |
| Vindicator | 95 | 94 | 94 | .... |
| Work | 22¼ | 21½ | 22¼ | 51,200 |

SAN FRANCISCO Nov. 8

| Name of Company. | High | Low | Clg | Sales |
|---|---|---|---|---|
| Best & Belcher | 1.30 | 1.25 | 1.30 | 500 |
| Caledonia | .55 | .45 | .55 | 2,200 |
| Challar | .20 | .13 | .20 | 12,100 |
| Con. Cal. & Va | 1.45 | .96 | 1.45 | 9,650 |
| Crown Point | .25 | .17 | 25 | 4,400 |
| Gould & Curry | .42 | .38 | 42 | 6,500 |
| Hale & Norcross | 1.25 | 1.00 | 1.25 | 4,450 |
| Mexican | 1.50 | 1.05 | 1.50 | 5,000 |
| Ophir | 3.60 | 3.10 | 3.60 | 5,000 |
| Overman | .22 | .15 | .22 | 2,600 |
| Potosi | .20 | .16 | .20 | 3,500 |
| Savage | 1.60 | 1.05 | 1.60 | 4,000 |
| Sierra Nevada | 1.60 | .86 | 1.60 | 6,800 |
| Bullfrog Mining | .65 | .52 | .62 | 73,450 |
| Diamondfield B. B. Con. | .53 | .39 | .50 | 93,566 |
| Goldfield of Nevada | 1.70 | 1.02 | 1.70 | 48,350 |
| Jim Butler | 1.80 | 1.55 | 1.67 | 25,500 |
| Jumping Jack | .56 | .52 | .54 | 67,055 |
| Kendall | .95 | .70 | .90 | 36,550 |
| MacNamara | .87 | .81 | .81 | 25,800 |
| Manhattan Dexter | .75 | .50 | .67 | 22,200 |
| North Star | .52 | .45 | .52 | 25,550 |
| Original Bullfrog | .26 | .16 | .23 | 46,062 |
| Tonopah Belmont | 6.75 | 6.75 | 6.75 | 2,000 |

## Tonopah Stocks Nov. 14.

(Revised by Weir Bros. & Co., New York)

| | High. | Low. | Last. |
|---|---|---|---|
| Tonopah Mine of Nevada | 20.50 | 20.25 | 20.25 |
| Tonopah Montana | 4.35 | 4.25 | 4.25 |
| Tonopah Extension | 7.50 | 7.12½ | 7.25 |
| Tonopah Midway | 3.00 | 2.85 | 2.95 |
| Tonopah West End Cons | 2.50 | 2.40 | 2.45 |
| Goldfield Mining Co. | 1.65 | 1.60 | 1.62 |
| Jumbo Mining | 4.75 | 4.62½ | 4.62½ |
| Red Top | 4.75 | 4.62½ | 4.62½ |
| Sandstorm | .97 | .94 | .95 |
| Montgomery Shoshone Cons | 16.75 | 16.00 | 16.25 |

## St. Louis Nov. 10.

Adams, $0.40—$0.26; American Nettie, $0.08—$0.06; Center Creek, $2.30—$2.00; Central Coal and Coke, $64.50—$6300; Central Coal and Coke, pfd., $80.00—070.00; Central Oil, $60.00—$55.00; Columbia, $4.00—$3.80; Con. Coal, $25.50—$24.00; Doe Run, $160.00—$140.00; Granite Bimetallic, $0.20—$0.15; St. Joe, $15.00—$13.00.

## LONDON. *(By Cable.*)* Nov. 14.

Dolores, £1 10s. 0d.; Stratton's Independence, £0 3s. 6d.; Camp Bird, £1 9s. 3d.; Esperanza, £2 10s. 0d.; Tomboy, £1 12s. 6d.; El Oro, £1 8s. 0d.; Oroville, £1 1s. 9d.; Somera, £0 6s. 3d.; Utah Apex, £1 11s. 10½d.; Ariz. Copper, pref., £3 12s. 6d.; Ariz. Copper, def., £3 10s. 6d.

*Furnished by Hayden, Stone & Co., New York.

## New Dividends

| Company. | Payable. | Rate. | Amt. |
|---|---|---|---|
| Am. Smelters' Sec., pfd. A | Dec. 1 | $1.50 | $255,000 |
| Am. Smelters' Sec., pfd. B | Dec. 1 | 1.25 | 375,000 |
| Bunker Hill & Sullivan | Nov. 5 | 0.60 | 180,000 |
| Butte Coalition | Nov. 14 | 0.40 | 400,000 |
| Calumet & Arizona | Dec. 20 | 4.00 | 800,000 |
| Greene Con. Copper | Nov. 30 | 0.40 | 40,000 |
| Homestake, S. Dak. | Nov. 26 | 0.50 | 109,200 |
| Lehigh Coal & Nav | Nov. 27 | 2.00 | 693,794 |
| Parrot, Mont. | Dec. 12 | 0.25 | 57,462 |
| Shannon Copper | Dec. 20 | 0.50 | 150,000 |
| U. S. Steel, com. | Dec. 31 | 0.50 | 2,541,512 |
| U. S. Steel, pfd. | Nov. 30 | 1.75 | 6,304,919 |

## Assessments

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Challenge Con. | Nov. 27 | Dec. 18 | $0.10 |
| Con. New York | Nov. 22 | Dec. 12 | 0.05 |
| Con. St. Gothard, Cal. | Nov. 10 | Dec. 10 | 0.10 |
| Douglas, Idaho | Nov. 20 | Dec. 10 | 0.005 |
| Deer Lodge, Utah | Nov. 12 | Dec. 5 | 0.005 |
| Etna-King, Cal. | Nov. 10 | Dec. 3 | 0.015 |
| Maxfield, Utah | Nov. 3 | Nov. 24 | 0.03 |
| Savage, Nev. | Nov. 26 | Dec. 17 | 0.10 |
| Sierra Nevada | Nov. 27 | Dec. 17 | 0.10 |

## Monthly Average Prices of Metals

### SILVER.

| Month. | New York. | | London. | |
|---|---|---|---|---|
| | 1905. | 1906. | 1905. | 1906. |
| January | 60.690 | 65.288 | 27.930 | 30.113 |
| February | 61.023 | 66.108 | 28.047 | 30.464 |
| March | 58.046 | 64.597 | 26.794 | 29.854 |
| April | 56.600 | 64.765 | 26.108 | 29.964 |
| May | 57.832 | 66.976 | 26.664 | 30.968 |
| June | 58.428 | 65.394 | 26.910 | 30.185 |
| July | 58.915 | 65.105 | 27.163 | 30.113 |
| August | 60.259 | 65.949 | 27.822 | 30.529 |
| September | 61.695 | 67.927 | 28.528 | 31.483 |
| October | 62.084 | 69.523 | 28.637 | 32.148 |
| November | 63.849 | ..... | 29.493 | ..... |
| December | 64.850 | ..... | 29.977 | ..... |
| Year | 60.352 | ..... | 27.839 | ..... |

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

### COPPER.

| | NEW YORK. | | | | LONDON. | |
|---|---|---|---|---|---|---|
| | Electrolytic. | | Lake. | | | |
| | 1905. | 1906. | 1905. | 1906. | 1905. | 1906. |
| Jan. | 15.008 | 18.310 | 15.128 | 18.419 | 68.262 | 78.896 |
| Feb. | 15.011 | 17.869 | 15.136 | 18.116 | 67.963 | 78.147 |
| March. | 15.125 | 18.361 | 15.250 | 18.641 | 68.174 | 81.111 |
| April. | 14.920 | 18.375 | 15.045 | 18.688 | 67.017 | 84.798 |
| May | 14.627 | 18.457 | 14.820 | 18.724 | 64.875 | 84.867 |
| June. | 14.673 | 18.442 | 14.813 | 18.719 | 65.881 | 83.994 |
| July. | 14.888 | 18.190 | 15.005 | 18.585 | 66.887 | 81.167 |
| Aug. | 15.664 | 18.380 | 15.725 | 18.706 | 69.830 | 83.864 |
| Sept. | 15.965 | 19.033 | 15.978 | 19.328 | 69.667 | 87.831 |
| Oct. | 16.279 | 21.203 | 16.332 | 21.722 | 71.406 | 97.269 |
| Nov. | 16.599 | ..... | 16.758 | ..... | 74.727 | ..... |
| Dec. | 18.328 | ..... | 18.398 | ..... | 78.993 | ..... |
| Year. | 15.590 | ..... | 15.699 | ..... | 69.465 | ..... |

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

### TIN IN NEW YORK.

| Month. | 1905. | 1906. | Month. | 1905. | 1906. |
|---|---|---|---|---|---|
| Jan. | 29.325 | 36.390 | July | 31.760 | 37.275 |
| Feb. | 29.262 | 36.403 | August | 32.866 | 40.606 |
| March. | 29.523 | 36.662 | Sept | 32.095 | 40.516 |
| April. | 30.525 | 38.900 | Oct | 32.481 | 42.852 |
| May. | 30.049 | 43.313 | Nov. | 33.443 | ..... |
| June. | 30.329 | 39.260 | Dec. | 35.835 | ..... |
| | | | Av. year. | 31.358 | ..... |

Prices are in cents per pound.

### LEAD IN NEW YORK.

| Month. | 1905. | 1906. | Month. | 1905. | 1906. |
|---|---|---|---|---|---|
| Jan. | 4.552 | 5.600 | July | 4.524 | 5.750 |
| Feb. | 4.450 | 5.464 | Aug. | 4.665 | 5.750 |
| March. | 4.470 | 5.350 | Sept. | 4.850 | 5.750 |
| April. | 4.500 | 5.404 | Oct. | 4.850 | 5.750 |
| May. | 4.500 | 5.685 | Nov. | 5.200 | ..... |
| June. | 4.500 | 5.750 | Dec. | 5.422 | ..... |
| | | | Av., year. | 4.707 | ..... |

Prices are in cents per pound. The London average for January, 1906, was £16,850 per long ton; February, £16,031; March, £15,922; April, £15,959; May, £16,725; June, £16,813; July, £16,525; August, £17,109; September, £18,266; October, £19,350.

### SPELTER.

| Month. | New York. | | St. Louis. | | London. | |
|---|---|---|---|---|---|---|
| | 1905. | 1906. | 1905. | 1906. | 1905. | 1906. |
| Jan. | 6.190 | 6.487 | 6.032 | 6.337 | 25.062 | 28.225 |
| Feb. | 6.139 | 6.075 | 5.989 | 5.924 | 24.594 | 25.844 |
| Mar. | 6.067 | 6.209 | 5.917 | 6.056 | 23.825 | 24.563 |
| April. | 5.817 | 6.078 | 5.667 | 5.931 | 23.813 | 25.781 |
| May. | 5.434 | 5.997 | 5.284 | 5.846 | 23.594 | 27.000 |
| June. | 5.190 | 6.096 | 5.040 | 5.948 | 23.875 | 27.728 |
| July. | 5.396 | 6.006 | 5.247 | 5.856 | 23.938 | 26.800 |
| Aug. | 5.706 | 6.027 | 5.556 | 5.878 | 24.675 | 26.988 |
| Sept. | 5.887 | 6.216 | 5.737 | 6.056 | 26.375 | 27.568 |
| Oct. | 6.087 | 6.222 | 5.934 | 6.070 | 28.225 | 28.075 |
| Nov. | 6.145 | ..... | 5.984 | ..... | 28.500 | ..... |
| Dec. | 6.522 | ..... | 6.374 | ..... | 28.719 | ..... |
| Year. | 5.822 | ..... | 5.730 | ..... | 25.433 | ..... |

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.